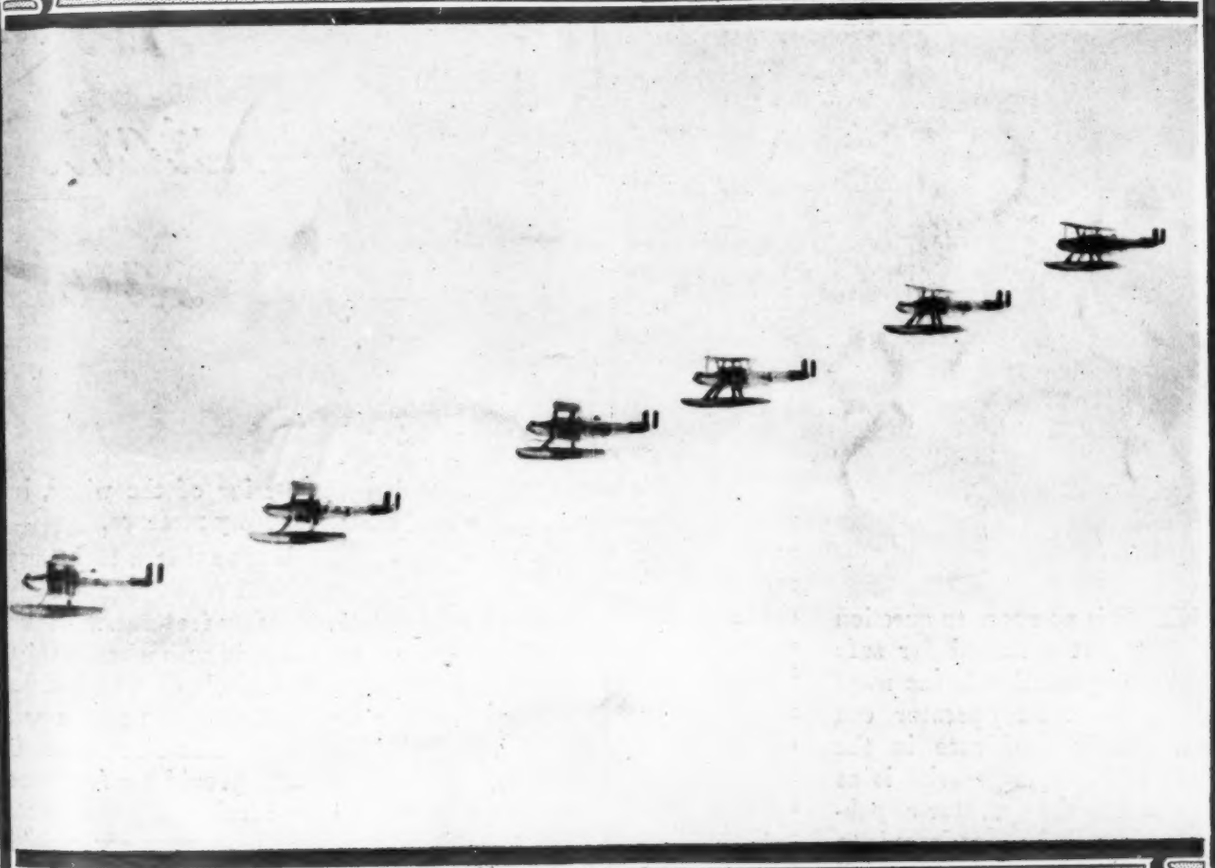
TECHNICAL DEPT.

AVIATION

The Oldest American Aeronautical Magazine

NOVEMBER 21, 1927 Issued Weekly PRICE 20 CENTS



A flight of Navy torpedo planes flying in step formation at San Diego, Calif.

U. S. A.

VOLUME XXIII

NUMBER 21

Special Features

The Mohawk "Pinto"
Fog and Night Flying
A "Flying Schoolhouse"

AVIATION PUBLISHING CORPORATION
250 WEST 57 STREET, NEW YORK

Publication Office, Highland, N. Y. Entered as Second-Class Matter, Nov. 22, 1920, at the Post Office, at Highland, N. Y. under Act of March 3, 1879.

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The value of a reputation for safety

THERE is no room to question the fact that a record for safe aerial transportation is the most precious asset an operator can have. Public confidence in the safety of his flying service is as important to the operator as public confidence in its soundness is to a bank. Nothing else counts until that is settled.

Safety has been the first consideration in every aspect of design and construction of the Ford all-metal monoplane. That safety has been provided in extraordinary measure is shown by the two-and-a-half-year record of Ford flight operations. During that time there has been one accident —the result of encountering a tornado. One accident in 7700 hours' flying on daily schedules every season of the year!

During this last summer 13,000 passengers were carried in Ford monoplanes. No accidents! This record cannot be credited to any single virtue in the Ford monoplane, but to a combination of all its features of design and materials. The great inherent stability of the plane, permitting it to be flown hands off for long periods of time in all but the roughest air, contributes to any safety record Ford monoplanes make. So does all-metal construction with its freedom from fire hazard and measured strength which permits accurate gauging of safety factors. Power-plant reliability provided by three Wright Whirlwind engines, any two of which will maintain flight, contributes greatly to the cause of safety. So do the brakes which give automobile control of the plane on the ground, and which make small fields safe for landings. Ease of inspection of every part of the ship, including the interior of the wings, is another safety measure.

It is true that a flight may be completed safely without any of these safety features. But it is also true that in such a case safety depends entirely on a high order of skill and vigilance on the part of the pilot. The Ford monoplane, however, provides safety not only under ideal conditions but also under the emergency conditions met in year 'round service, in the hands of a pilot whose average performance may be far below unfailing perfection.

In providing that unique measure of safety, the Ford tri-motored transport gives the air-line operator a real chance to make a confidence-inspiring safety record—the record which must be the source of traffic and earnings.

THE STOUT METAL AIRPLANE CO.
Division of Ford Motor Company
Dearborn, Michigan

Their CHOICE...

SHOULD guide you . . . the selection and purchase of Fairchild "All-Purpose" Cabin Monoplanes by these outstanding organizations and operators is the best endorsement of real value we have built into the 'plane. If you are looking for the utmost in performance, workmanship and service, you, too, will find in Fairchild everything an airplane can offer.

AMERICAN AIRCRAFT COMPANY,
Los Angeles, California

BROCK AND WEYMOUTH,
Philadelphia, Penn.

CURTISS FLYING SERVICE,
Garden City, Long Island, N. Y.

COLONIAL AIR TRANSPORT,
New York City

DEPARTMENT OF NATIONAL DEFENSE OF CANADA

DENNISON AIRCRAFT CORPORATION,
Boston, Mass.

FAIRCHILD AVIATION LTD.,
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E. M. JONES,
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Philadelphia, Penn.

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POTOMAC FLYING SERVICE,
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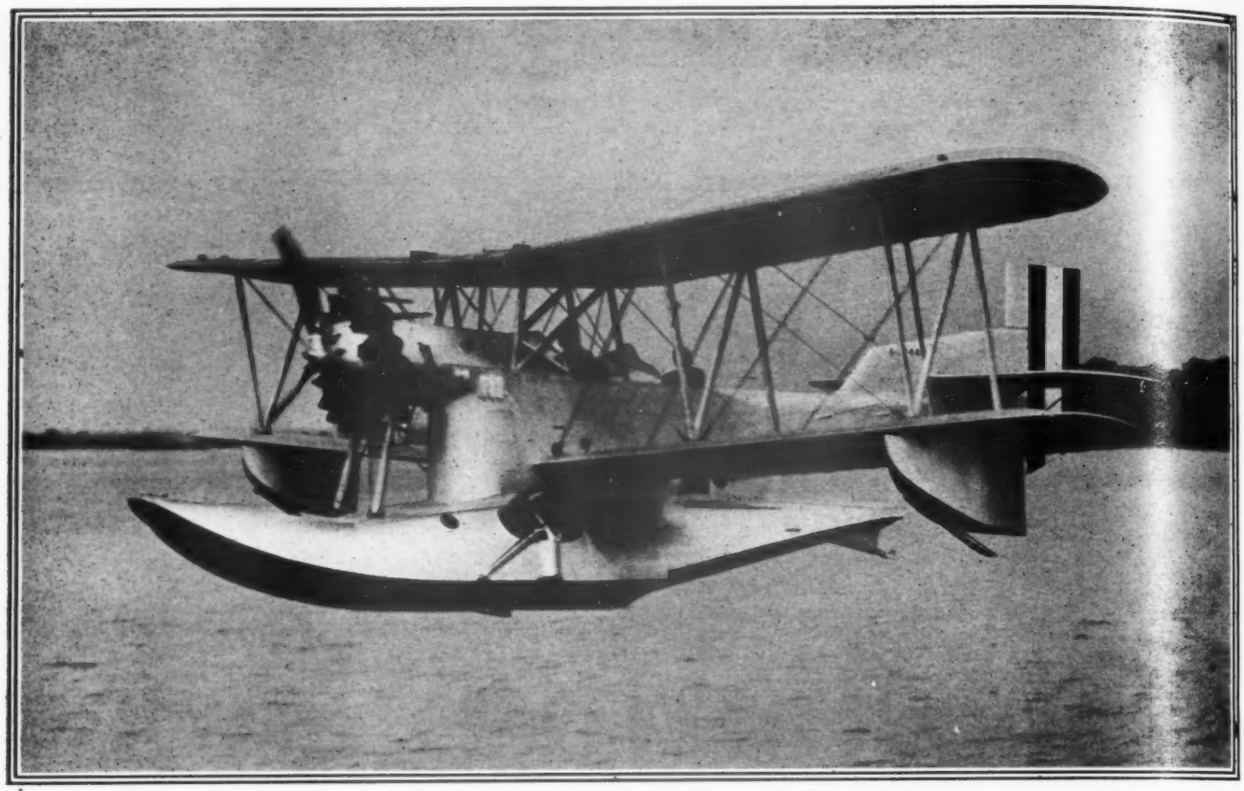
FAIRCHILD AIRPLANE MANUFACTURING CORPORATION, FARMINGDALE, L. I., NEW YORK



The Latest Loening Amphibian uses "Wasp" Engines

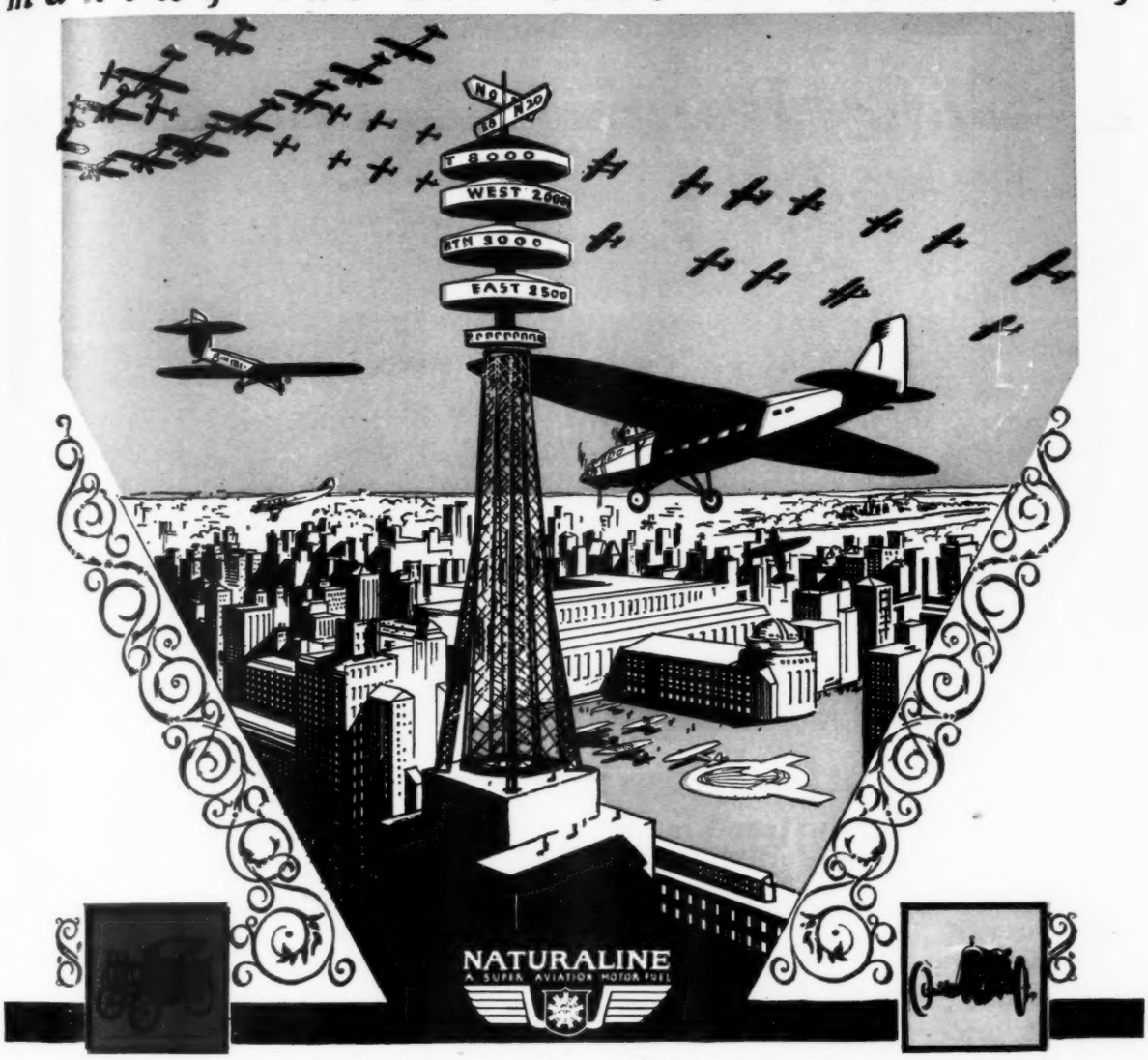
This new plane is the latest addition to the ever growing list of Wasp installations. In the Amphibian t has shown a considerable increase in performance over its water-cooled predecessor.

Superior characteristics have made the "Wasp" one of the most versatile engines. Its application now includes Single and Two-place Fighters, Amphibians, Bombers, and Commercial Transport Planes.

THE
PRATT & WHITNEY AIRCRAFT CO.
HARTFORD CONNECTICUT

DEPENDABLE ENGINES

Making the air safe for humanity



1902

The Motor car of 1902 was a noisy reminiscent of the boiler works. It spluttered — balked — and frightened everyone but the daredevil at the wheel. Many a person remembers the famous gag of the day, "Git a Horse," as the jerky, buggy-wheeled, side cranking, chain drive, "Horseless perambulator" made its way through the town.

Hordes of 'planes — turning — twisting — darting — climbing — rearing thrcugh the skies. Well ordered traffic — careful regulation to insure the safety of the fliers of Tomorrow. Police in the air who govern the aerial routes.

For the traffic of Tomorrow — as well as for the traffic of Today — safe fuel is of paramount importance. It must be light in weight, volatile, and absolutely dependable.

NATURALINE was developed for the purpose of meeting the conditions of the future — and the present necessities arising through the advent of high compression motors in the new day motor cars. Forty-six pounds per hundred gallons lighter than U. S. Army Fighting Grade Gasoline — **NATURALINE** presents a measure of safety and dependability that is not found in other gasoline. It vaporizes instantly and surely, and for aviation or the modern motor, can not be excelled.

1927

In twenty-five years the motor car has developed to a point undreamed of in 1902, a specially designed car recently making the incredible speed of 203 miles per hour. Cars at a nominal cost perform amazingly. The man who does not own or operate a motor vehicle is the exception — the high compression motor giving a greater motor efficiency has just been introduced. What will the next twenty-five years do for the motor car? Or will it not be aviation?

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Responsible pilots desiring to test "Naturaline" will be supplied by applying to Aviation Service Corporation, 12 West 40th Street, New York City.

The Ryan Brougham

Five Place Monoplane

Cruising Range 750 miles

Leading a new trend in aeronautical design we have built the Brougham to carry 83 gallons of gasoline, pilot, four passengers, and baggage of five suit cases conveniently stowed out of the way in the rear.

Fully loaded the usual performance of this type monoplane is at once apparent, quick take-off, slow landing speed, high cruising speed, and excellent maneuverability.

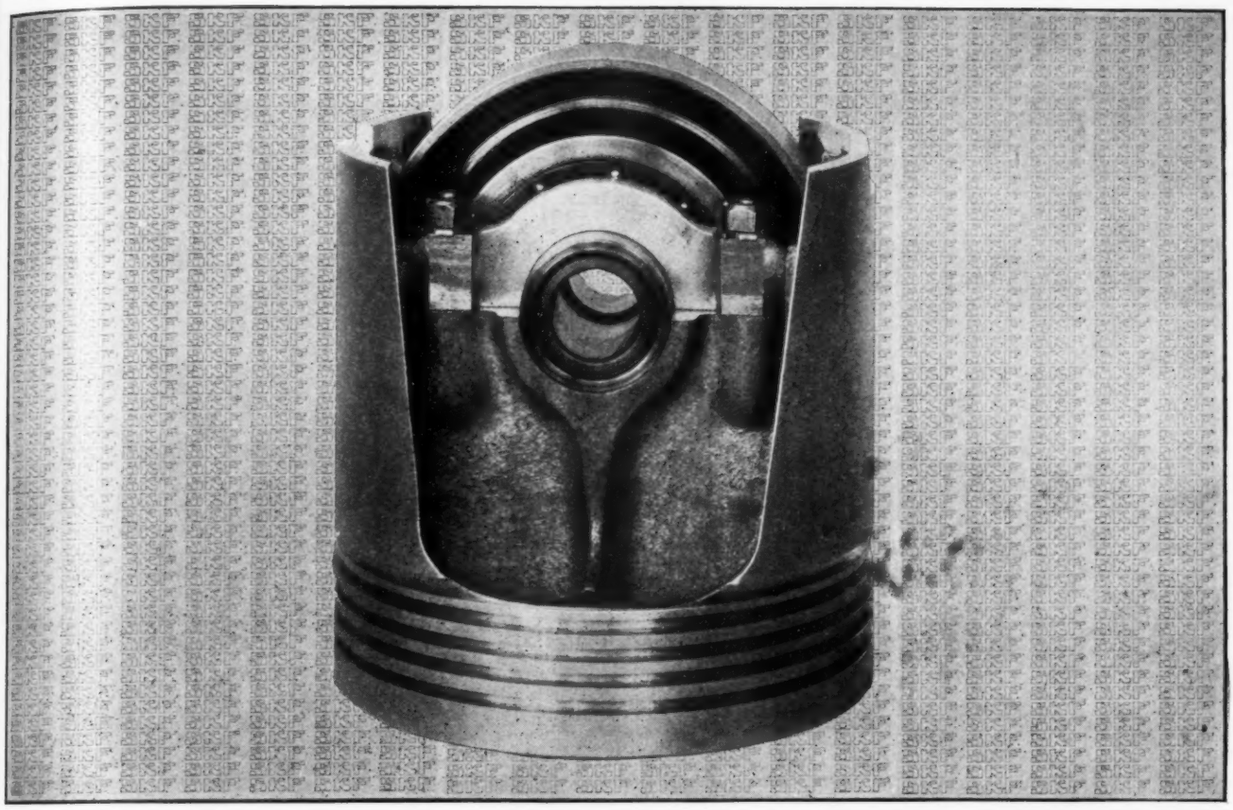
Upholstered in silk mohair with the entire cabin insulated with Balsam wool, owners are finding this newest product of the Mahoney Factory not only efficient and economical but unusually comfortable.

"The same model that Colonel Lindbergh flew, adapted to passenger carrying."

WITH SUPER-INSPECTED J-5-C MOTOR **$9,700.00**

B. F. MAHONEY AIRCRAFT CORP.

SAN DIEGO, CALIFORNIA



SKF Bearings Have the Sustaining Power to Stand up Under Tremendous Loads at High Speeds

AGAIN and again, SKF Anti-Friction Bearings are proving their enduring qualities — in the air. Not only in front-page news, but the far more important fields of government and commercial service. Speed, endurance, long life, dependability—these are demanded of anti-friction bearings and — Fairchild-Caminez knew that SKF would meet all requirements.

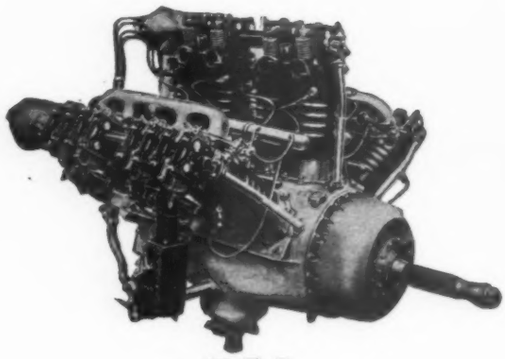
The cylinder shown is one of four on a 150 H. P. motor equipped with SKF roller bearings. These bearings are subject to both a reciprocating and an accelerating motion. While the motor operates at a speed of 1200 R. P. M. the bearings make 4,800 accelerations and decelerations from 1560 R. P. M. to 2600 R. P. M. Extreme service for anti-friction bearings? Yes—but SKF bearings have the sustaining power to stand up under tremendous loads at high speeds.

SKF INDUSTRIES, INC., 40 East 34th Street, New York, N. Y.

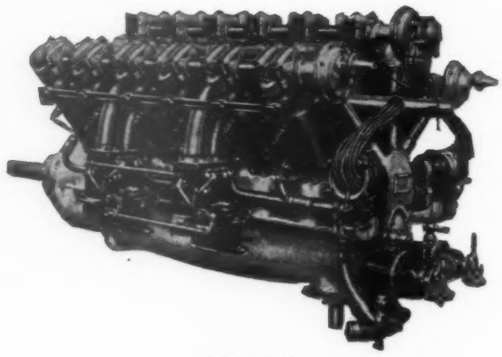
1914

Ball Bearings **Roller Bearings**

LORRAINE-DIETRICH AIRPLANE ENGINES



450 H. P.
Direct drive or geared



650 H. P.
Direct drive or geared

A Result of Vast Technical Experience

Simple design and construction, economical maintenance and great reliability

LORRAINE-DIETRICH engines are the best known and most widely used in the world. Not only have they achieved brilliant records which have received world-wide acclaim, but they have driven and are driving thousands of planes, both civilian and military, through the daily routine which demands so much of an engine and about which so little is said.

Some Notable Lorraine-Dietrich Performances

1925

34,000 miles in 380 hours of flight — Rome-Melbourne-Tokio-Rome, achieved by Colonel De Pinedo in a S. A. V. O. I. A. flying boat with 450 H. P. engine.

New York-Buenos Aires, by Duggan, Olivero and Campanelli, in a S. A. V. O. I. A. flying boat, with a 450 H. P. engine.

1926

3,900 miles in 3 days, by Arrachart and Carol, (Circuit des Capitales), in a Potez XXV, with 450 H. P. engine.

6,560 miles in 6 days, 18 hours, Paris-Peking by Pelletier-Doisy and Carol in a Breguet with 450 H. P. engine.

6,500 miles in 9 days, (9 stops) Tokio-Copenhagen by Captain Botved flying a Fokker with 450 H. P. engine.

4,000 miles in 41 hours 45 minutes, total time, Paris-Rome-Tunis-Casablanca-Paris by Pelletier-Doisy and Gonnin in a Potez 25 with 450 H. P. engine.

1927

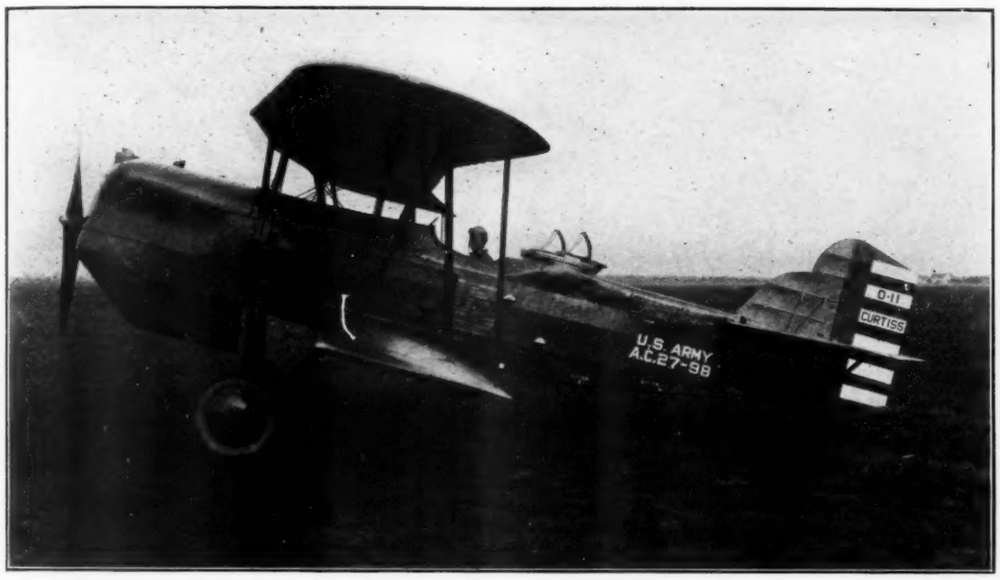
15,000 miles in flying boat across Africa by Capitaine de corvette Guilbaud and mechanic Rapin.

Crossing South Atlantic, from Boloma to San Fernando de Norohna, 1600 miles in a non-stop night flight of 17 hours, 30 minutes by Major Sarmiento de Beires.

SOCIÉTÉ LORRAINE-DIETRICH

ARGENTEUIL (Seine-et-Oise) FRANCE

THE NATIONAL GUARD UP-TO-DATE



The Curtiss O-11 "Falcon"

Time was when the National Guard was considered more or less as a "home-town outfit." Not particularly well equipped, — chiefly of value, perhaps, in local emergencies, strikes, riots.

Then came the World War — and these same National Guard units, in spite of the handicaps of insufficient training and equipment, blossomed overnight into first-class fighting units — writing their history on the battle-fields of France in glorious fashion.

Today the National Guard, efficiently organized, well trained, properly equipped, is an extremely important part of our scheme of national defense. And like all up-to-date military organizations it has taken to the air.

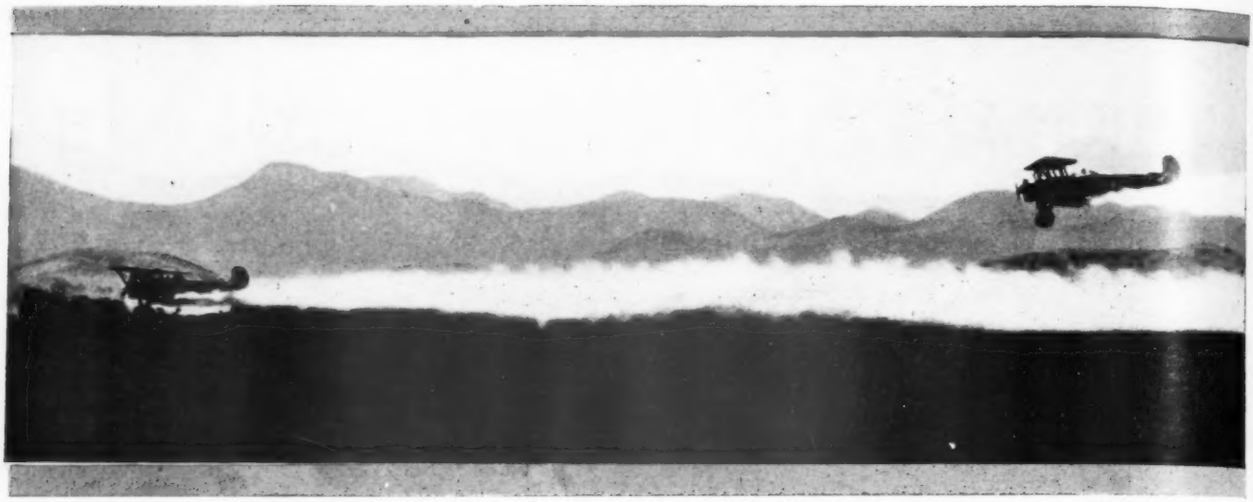
Deliveries are now being made on a quantity order of Curtiss O-11 "Falcons", built for exclusive use of the National Guard. The "Falcon" is the machine which is being supplied in large quantities as the standard two-seater observation and attack plane of the U. S. Army Air Corps.

The CURTISS AEROPLANE AND MOTOR CO., Inc.

Offices:
Garden City, N. Y.

Curtiss

Factories:
Garden City and Buffalo, N. Y.



Fighting the Boll Weevil in Peru

Mobiloil takes a hand

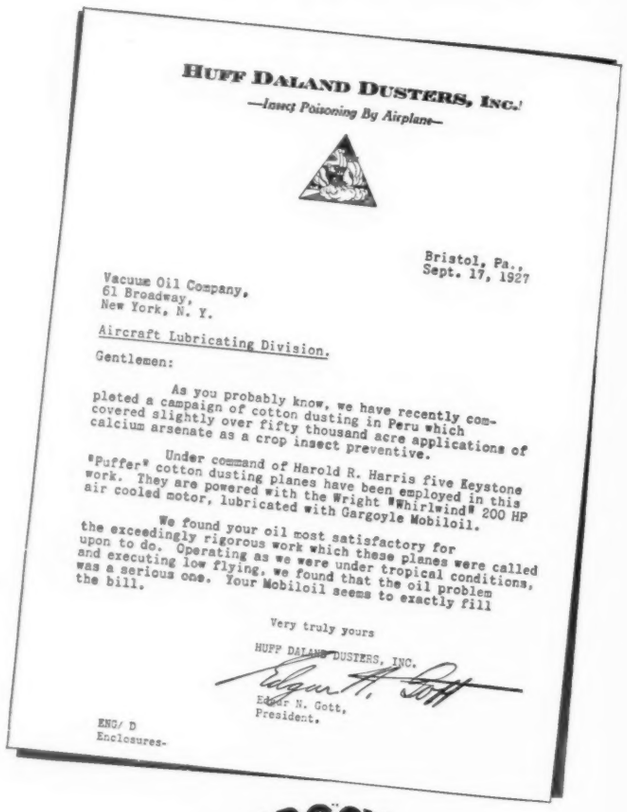
One of the most serious problems confronting the cotton industry is the ravenous appetite of the Boll Weevil. And the airplane has been enlisted in the fight against this pest.

Huff Daland Dusters, Inc., recently sent five Keystone "Puffer" cotton dusting planes to Peru, establishing South American headquarters at Lima, Peru. They executed contracts for the largest planters including A. B. Leguia, President of Peru, and dusted over 50,000 acres of plants in the Canete and Cincha Valleys.

Just as the Boll Weevil worries the cotton growers, lubrication is a serious problem for the airplane operator. The Huff Daland Dusters forestalled lubrication troubles with their motors through the use of Mobiloil. The letter reproduced here tells clearly how efficiently Mobiloil worked even in the tropical climate of Peru.

In North America, South America, Europe, Asia and Africa, Mobiloil is the choice of aviators. Mobiloil was used by Lindbergh when he flew from New York to Paris; by Goebel and the U. S. Army fliers to Hawaii and around the world, and by other famous fliers. And the majority of airplane manufacturing companies select Mobiloil for test and development work.

You can depend upon Mobiloil to relieve you of lubrication worries. And besides, you can buy Mobiloil wherever you go. Mobiloil is for sale at, or within reasonable distance of every flying field in this country.



HUFF DALAND DUSTERS, INC.
—Insect Poisoning By Airplane—

Bristol, Pa.,
Sept. 17, 1927

Vacuum Oil Company,
61 Broadway,
New York, N. Y.

Aircraft Lubricating Division.

Gentlemen:

As you probably know, we have recently completed a campaign of cotton dusting in Peru which covered slightly over fifty thousand acre applications of calcium arsenate as a crop insect preventive.

Under command of Harold R. Harris five Keystone "Puffer" cotton dusting planes have been employed in this work. They are powered with the Wright "Whirlwind" 200 HP air cooled motor, lubricated with Gargoyle Mobiloil.

We found your oil most satisfactory for the exceedingly rigorous work which these planes were called upon to do. Operating as we were under tropical conditions, and executing low flying, we found that the oil problem was a serious one. Your Mobiloil seems to exactly fill the bill.

Very truly yours

HUFF DALAND DUSTERS, INC.

Edgar N. Gott,
President.

ENG/ D
Enclosures-

GARGOYLE

Mobiloil

VACUUM OIL COMPANY

MAIN BRANCHES: New York, Chicago, Philadelphia, Boston, Buffalo, Detroit, Pittsburgh, Minneapolis, St. Louis, Kansas City, Dallas

Other branches and distributing warehouses throughout the country

AVIATION

The Oldest American Aeronautical Magazine

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AVIATION PUBLISHING CORPORATION
Business and Editorial Offices
230 West 57th St., New York City
Cable Address: AEROENG
Publication Office: Highland, New York

Subscription price: Four dollars per year. Canada, five dollars. Foreign, six dollars. Single current copies, twenty cents. Back numbers, 25 cents. Advertising rates on application. Issued every Monday. Forms close ten days previously. Entered as second-class matter Nov. 22, 1920, at the Post Office at Highland, N. Y., under act of March 3, 1879. *Copyright 1927 by Aviation Pub. Corp.*

The Pitcairn Sesquiwing, which James Ray piloted to first place in the two fastest civilian races at the Spokane National Air Races.

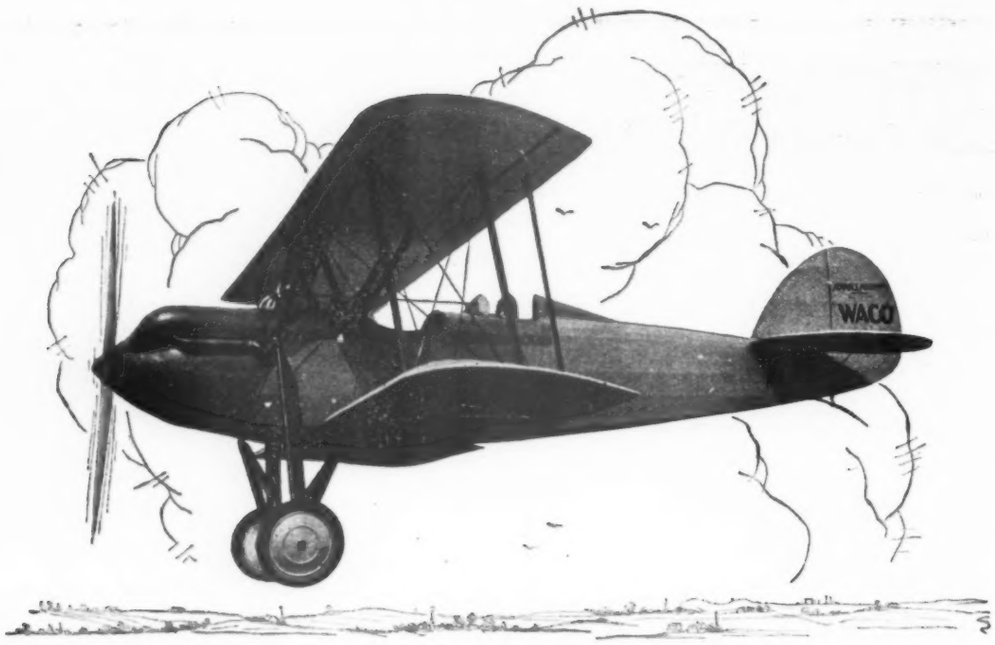
Powered With Curtiss C-6
160 hp. Engine

Equipped With

SCINTILLA

Aircraft Magnetos

SCINTILLA MAGNETO COMPANY
SIDNEY, NEW YORK
Contractors to the U. S. Army and Navy



WACO'S Traditional Reputation Invites You to Fly It

Climb into the cockpit of the WACO TEN — take the stick — fly it — and immediately you will know why it is the recognized leader in performance and smoothness.

Once you have felt the instant obedience of WACO to your every wish and desire — its exceptional top speed attained without effort— its hands off flying stability — its perfect landing on hydraulic split-type landing gear — you'll agree that it is without an equal.

Not only is WACO exceptional in performance — its trim beauty — streamlined cowl — efficient windshields — properly inclined seats, deeply cushioned — cockpit door and finish have all been designed to carry out WACO standards spoken of wherever aviation is the topic.

There is a WACO dealer near you who will put a ship at your disposal so that you may see and feel for yourself the comfort and performance which has made it an undeniable leader in its class.

A wire or letter will bring you details.

Approved Type Certificate No. 13

WACO AIRPLANES

MANUFACTURED BY ADVANCE AIRCRAFT CO., TROY, OHIO

AVIATION

The Oldest American Aeronautical Magazine

Vol. XXIII *NOVEMBER* 21, 1927 No. 21

Flying Collegians

ANNOUNCEMENT HAS been made that Grover Loening, president of the Loening Aeronautical Engineering Corp., of New York City, has set aside a prize fund of $5,000 to be used for an annual award for an intercollegiate flying contest to be held each year among aeronautical students representing American colleges. The object of creating the fund is to encourage flying in the colleges of this country, and all contests and awards are to be executed according to rules and regulations yet to be set down by the National Aeronautic Association.

Mr. Loening is to be congratulated for this, his latest endeavor, for it will undoubtedly go far toward increasing "air-mindedness" on the campus. Right now the flying squadrons of Oxford and Cambridge, in England, are planning inter-university flying meets, and if such comes to pass in this country it should prove most beneficial to the industry, not alone from the standpoint of plane purchases but also from the standpoint of an increased number of qualified pilots.

The Unthinking Press

MUCH OF the present popularity of aviation is due to the power of the press, for had it not been for the daily publicity given the recent aerial exploits the general public would not now be so conversant as to what this business of flying is all about. And so, the aeronautical world can be thankful for the part that newspapers have played in fostering the art, as regards bringing its existence before the attention of the man in the street.

However, city news editors and other press officials usually regard events from the standpoint of news alone, which is perhaps only natural, but yet in so doing, inflict serious damage to the business standing and integrity of an innocent party. Of course it is not presumed that such action is intentional. Nevertheless, in the matter of printing the news of airplane crashes the daily press IS inflicting unwarranted injury.

An airplane crash, at this stage of the art of flying, is news. There is no doubt about that, nor is the aeronautical world seeking to hush the press on that point. BUT, there is absolutely no necessity of printing the name of the manufacturer who built the crashed plane. The manufacturer's name does not add one iota to the news story interest and its appearance in print can go far toward deterring prospective customers.

Statistics, superfluous as they sometimes are, show that the great majority of airplane crashes are due to the pilot's fault and not the unairworthiness of the plane. And in view of the fact that a manufacturer does not have charge of operation and maintenance of his products after they are sold, it is obviously unjust to give him damaging publicity as the result of a pilot's inability or misfortune.

Let the press print the news story of a crash in full and, if needs must, fill its columns with a vivid description of the affair, but omit the manufacturer's name for, in the overwhelming majority of cases, he is just as responsible for the crash as is the manufacturer of an automobile that fails to beat an express train to a grade crossing.

Bravo, Governor Trumbull!

FROM THE standpoint of aeronautics, the old adage "Practice What You Preach" has been aptly illustrated by Connecticut's chief executive Governor Trumbull who recently made his first solo flight and has since been granted Pilot's License No. 60. For some time Governor Trumbull has been an ardent aviation enthusiast and when he received sufficient instruction from Interstate Airways, Inc., to enable him to "take her off" alone, he realized a long-cherished ambition.

Governor Trumbull is to be congratulated not only because he has joined the ranks of those who can ride the skies alone, but also because of the example that he has set to those who believe that the airplane belongs to youth alone. When a high state executive is sold on the airplane to the extent of becoming a pilot, his followers should at least be sold enough to patronize it as a means of travel.

Subscribers Please Note

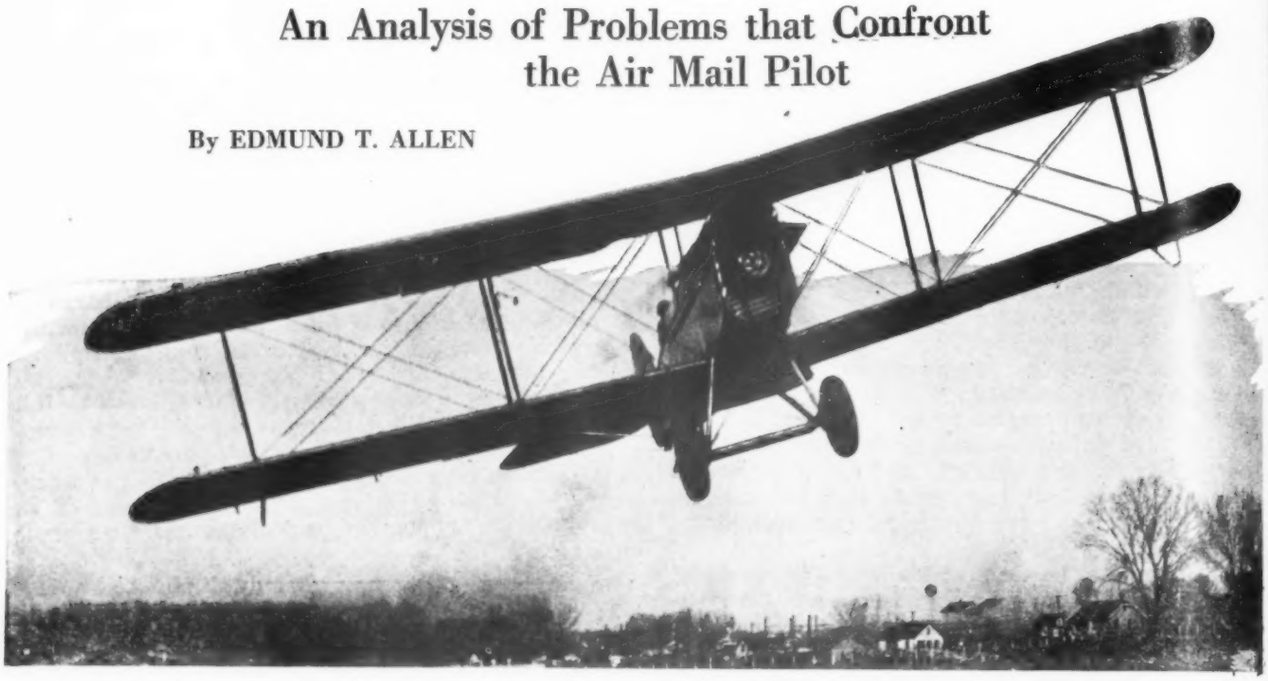
OUR CIRCULATION manager has informed us that 60 per cent. of the subscriptions to AVIATION expire with the last issue in December, and in order that no subscriber will miss an issue as the result of not being aware of his expiration date, the suggestion is herewith made to look at the wrapper of your next copy. If it bears the figures 12-31-27 it means that your subscription expires December 31, 1927.

Past experience has proven that a number who renewed their subscriptions late were disappointed in obtaining back issues as they had soon gone out of print. In order that such a condition may be avoided, it is requested that, if you desire to renew your subscription to AVIATION, you send in your renewal order ahead of time.

Flying *through* Fog *and* Night

An Analysis of Problems that Confront the Air Mail Pilot

By EDMUND T. ALLEN



A U. S. mail plane climbing off the ground.

"..... nor fog nor night can stop the pilot in his flight."

SO RUNS one version of an old saw that is often jestingly sung out from the hangar door when we "return account bad weather". This does not happen so often as the general public supposes. In good weather the thousands who go to see the night mail come in and depart, breathe a sigh of relief. A sigh, however, not entirely free of anxiety when the tail-light of the receding mail plane is quickly swallowed up in darkness. But on stormy nights when snow is falling thick and fog is in the air, there are no spectators for these arrivals and departures, and one finds on speaking to the man of the street the next morning, that he is quite incredulous when told that the air mail got through on time the night before. That small percentage of transcontinental flights which are not completed, in which the mail is transferred to the railroad mail trains for a part of the route, is practically all chargeable to our great enemy, fog. The goal of the air mail service is 100 per cent. delivery on time. To that end a constant analysis of the causes of defaults is useful.

For the year ending June 30, 1927, the Transcontinental Air Mail Service had an "efficiency" of 94.2 per cent. This includes the double day and night service between New York and Chicago and the single through 20 hr. service from Chicago to San Francisco. Of the 5.8 per cent. transcontinental flights uncompleted entirely by air, practically all were stopped en route by bad weather at night. Three-quarters of them were winter time defaults. In the daylight, fog rarely causes a serious delay of the schedule although at times it is the most heart-breaking foe imaginable.

One of the Central Division pilots was flying between Omaha and North Platte last winter during a bad spell of fog. The mail had not been delayed as yet, although the worst fog they had ever encountered was reported by some of the pilots on this division. On this particular day, flying at 50 ft. from the ground, the pilot could barely see the terrain and make out the highway directly below him. The fog became thicker and he nosed down and flew along at 20 ft. from the ground, trying to pierce the fog in front of him for possible poles, farm-houses, silos or trees. Then as it became thicker still, unable to make a turn without losing the ground, he pulled up, intending to climb through it and fly over the top until he came to a clear region. He climbed "blind" for 3500 ft. with eyes glued to the turn-indicator, compass, and bank indicator, when suddenly he saw he was collecting ice.

The Ice Peril

ICE! What a word of terror to the pilot in almost any circumstances. But caught between a "blind-landing with ice" and indefinite "blind-flying", it was terrifying threefold. To the layman ice collection means merely that curious phenomenon in which at certain temperatures and humidities, moisture collects and freezes on wires, struts, wings, and propeller, building up quickly a mass of hundreds of pounds. To the pilot it means often an immediately enforced landing, practically out of control or at a speed which would spell crash even on a smooth field where he can see where he is going. In fog, at night, or over rough country, it is usually fatal.

Unable to climb higher with this load of ice, the pilot started back down toward the ground, which he knew he might easily hit before he saw. It was a situation in which the use of his parachute might be called for. But he decided to stick to the airplane. Fortunately, as he descended, the ice melted and he was freed of his extra load, but he knew that his ceiling was below the top of the fog, for as soon as

he would reach again the 3500 ft. level, the ice would form again and prevent his climbing higher. He descended to 200 ft. as recorded on his altimeter, and then began feeling for the ground—at 115 m.p.h.

During this entire time he had been completely blind as far as everything except his instruments was concerned. His only indications of level were the rather vague assurances given him by his turn and bank-indicator (which, of course, registers as a single component, both the acceleration of a turn and the acceleration of gravity), by his airspeed indicator, and by the sound of his engine, which raced if the airplane were diving and labored if climbing steeply. The sphere of grey, of which he was the center, darkened below, indicating the presence of ground not far away (but just how far?) and the next instant,—tree tops! As he jerked back on the stick, the landing gear and lower wings swished through the top branches. This was the lowest point of the arc of his flight-path. Had it been anoother three feet lower—!

Eventually Determines Location

An instant later he was again the center of his grey sphere with the problem of finding the ground still unsolved. Again he "felt for the ground". Something dark went by one wing and he sensed, rather than saw, a farm-house and windmill, whose top was higher than he. A third nosing down brought out the grey of a barb-wire fence running parallel to his line of flight and directly under one wing-tip. This time he stuck to it, but he was considerably worried by his lack of uncertainty which barb-wire fence this was, and therefore what obstacles were ahead which were more than 15 ft. high. He determined to cut the switches and land dead ahead since the country was level, but each time he decided on the place to do it, a new cross-fence loomed up.

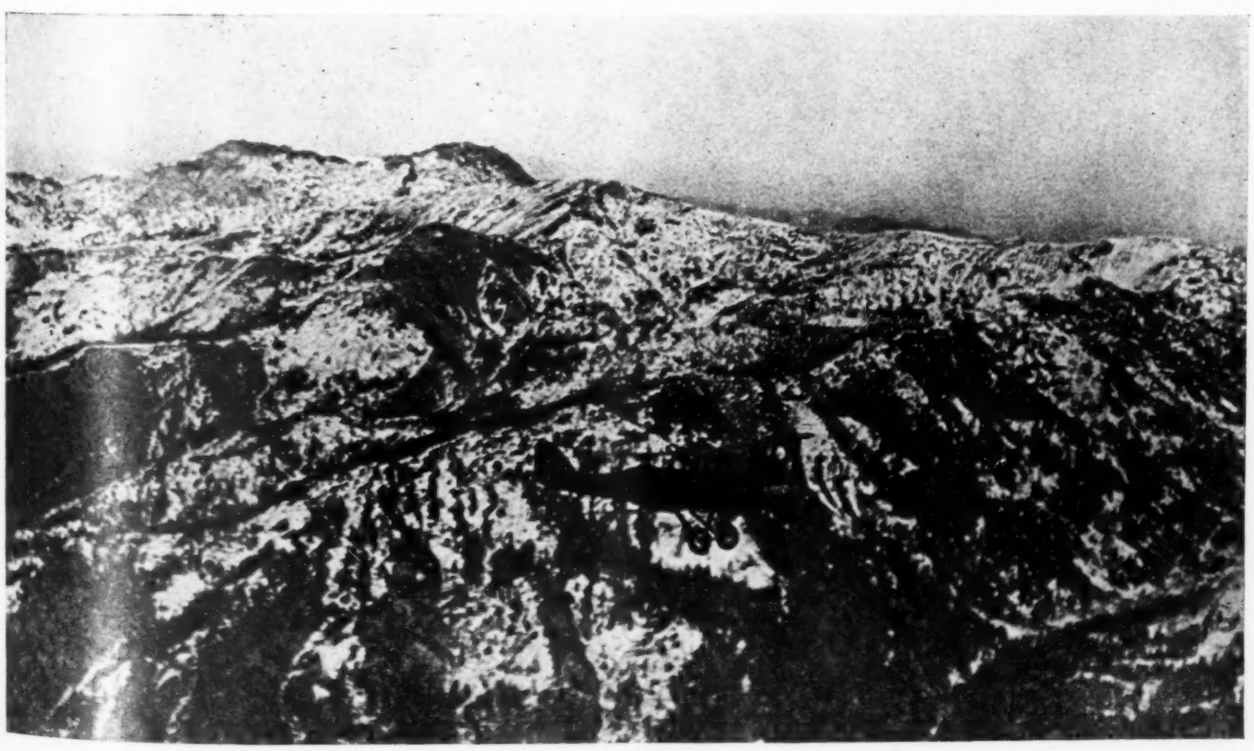
In this frame of mind he flew 30 mi. and was eventually relieved by the fog becoming slightly less dense so that he could resume his, comparatively safe, 50 ft. "vision-ceiling". He now quickly discovered that this was the barb-wire fence two miles south of the course and it was an easy matter to shift over to the Platte River and follow it to North Platte.

It is a common saying among those who know little about flying that a pilot will fly worse weather at night than in the daylight, because at night he cannot see how bad it is. Such a belief is absurb. We are not flying "blind" at present, except for very, very short stretches. Flying such as just described would have had a very different outcome had it been dark. One who has had such experiences in daylight knows that at night they usually end in crashes.

Why are we not doing "blind-flying"? Because, in the first place, each of the five Transcontinental pilots killed during

A good comparison of the past and present method of mail transportation can be made from the above photo which shows "Ed" Matucha, pilot of the N.A.T. mail and express plane shaking hands with Mr. Lee, an old "pilot" of the stage coach days.

the past three years was killed at night while flying "blind". In the second place, the danger that he will be unable to "keep an even keel" along three perpendicular axes and keep on a course for an indefinite period, is ever present. The third reason is that a forced landing under such conditions is often fatal, and a "parachute-exit", besides crashing the airplane, is not always accomplished safely. One could go on enumerating many more reasons, but they are relatively unimportant when placed beside the very great danger that one will be unable to land if the terminal airdrome is fog-bound,



A U. S. mail plane passing the "Hump" in the Sierra Nevadas

even though one is able to find one's way to it.

The writer has elsewhere analyzed some of the difficulties of navigation in fog.* It has been pointed out that the gyroscopic turn-indicator (so long as its driving mechanism does not become clogged with ice when ice collects on other exposed parts) and an airplane which is longitudinally and laterally stable and balanced, were the pilot's chief reliance in case of enforced fog-flying. Since that writing three transatlantic flights have successfully penetrated fog for almost indefinite periods of time and have demonstrated the possibility of exquisitely accurate navigation with the earth-inductor compass and drift-indicator*. The author of these articles has, since the last one, also had occasion to fly absolutely "blind" for periods as long as two hours when caught in heavy snow and fog at night over the Rockies. One of the transatlantic flights, however,—that of Commander Byrd —illustrates most strikingly the difficulty which lies at the root of the whole matter, viz.: How to get down and land at night on an airdrome which one cannot see.

Colonel Lindbergh's Experience

Col. Charles A. Lindbergh with his earth-inductor compass and drift-indicator, struck the Irish Coast three miles north of his theoretical point at which he had hoped to come. When it is realized that this is an error of less than one-tenth of one degree in his course from the last point at which he sighted land on the Newfoundland Coast, the exquisite precision of flying ability is apparent. A noted English authority says in The Aeroplane of May 25, 1927, "He [Lindbergh] can have done no real navigation on the way even if he knows anything about scientific navigation which is doubtful. He must have placed absolute trust in his compass and his own judgment of drift. There are undoubtedly certain people who, as pilots say, are 'born with a compass in their heads' and have a natural gift for finding their way across the country or across the sea....And thanks to that gift Lindbergh made good." Colonel Lindbergh himself puts it as follows, "I want to say that the fact that we came three miles from the theoretical point was a coincidence, but had it been 25 mi. it might have been navigation."

Let us take a typical case from the records of the Air Mail Service. The Douglas Mail Plane leaves Salt Lake City, eastbound, at 5:15 P.M. The radio message from Rock Springs, Wyoming—159 mi. air line to the east—states that there is a 1000 ft. ceiling, a two mile visibility, and that it is snowing lightly. The 1500 ft. mountain range just west of Rock Springs is in the clouds. The Cheyenne, Wyoming, radio station sends a message reporting it clear overhead but threatening to the north with a weather forecast of snow-flurries tonight and tomorrow. Weather reports have been received by telephone from intermediate fields indicating local snowstorms interspersed with clear spaces. It is just getting dark as the pilot leaves Salt Lake City.

Flies at Various Altitudes

He circles once to gain altitude and enters Immigration Canyon 300 ft. below the mist-covered ridges. Climbing as he proceeds, he reaches 9000 ft. in clearing the pass at the end of the canyon. The pass is 8800 ft. in altitude with canyon-walls well over 9000 ft. on each side. It is snowing and visibility is very poor. He drops down 1000 ft. in skirting Lewis' Peak, fog-enveloped, and, passing over the lights of Coalville in the valley below, he enters Chalk Creek Canyon under a heavy snow-cloud. The beacon-lights located at 25 mi. intervals are now visible, showing up as mere points of

U. S. mail plane on the Los Angeles-Salt Lake route 100 mi. out of Las Vegas.

light at ten second intervals when five miles away. The flying is easy except for drifting patches of snow-cloud detached from the main storm,—patches which he tries unsuccessfully to dodge. It is pitch-dark when he reaches the first desert plateau, but the moon has not yet set, and although it is not visible, its dim illumination diffuses through the heavy clouds overhead. The pilot comes down to within 100 ft. of the ground and flies directly over the Lincoln Highway. He cannot see the beacons until he is within a mile of them. Those who would replace our present five-million candlepower beacons, placed at 25 mi. intervals, with the European system of small Neon lights at 1½ mi. intervals, have not flown in such weather. While the Neon lights are supposed to pierce the fog, pilots report that they have never seen the one Neon beacon near the Transcontinental Route while they usually see the Sperry beacon placed beside it. The small 1½ mi. lights are relatively low candlepower and are useful thus far only in fair weather. While the pilot is flying across the Rocky Mountain Desert he thinks of these things and hopes only that the candlepower of his beacons will not be reduced and that their frequency will be increased. The ragged rocky pinnacles, sticking up from the desert, are memorized perfectly and he knows exactly when to swing over to the left hand side of the road to avoid a butte jutting up vertically on the right.

Green River is reached and the snow stops abruptly. The ceiling is about 1000 ft. There is just enough light diffused through the clouds and reflected from the snow-covered ground to show up the railroad tracks. The single ridge between Green River and Rock Springs rises 1200 to 1500 ft. above the river, the top part in solid cloud. He has no passengers and so he decides to climb over "blind". The ship is stable, climbs rapidly, and the turn-indicator is sensitive. The air is calm. He sets his course and pulls the stick back. Immediately he goes "blind". Everything except the instrument-board radiolite indicators becomes blank. All kinds of sensations come over him: he is banked to the right; he automatically puts his stick over to correct it, as he looks at his indicator; no, he was not banked to the right but is turning to

*"*Night Flying in Bad Weather", AVIATION, vol. XXI p. 461. Also "Blind-Flying", Slipstream, Vol. 7, p. 11, April 1926, both by the writer.*

the left, which he had not felt at all. He forces himself to obey not his feelings but his instrument-indicators which tell quite a different story. Suddenly he feels that everything is wrong, that he must be in a spin. He glues his attention to his instruments and realizes that the airplane is stalled;—over goes the stick to correct. Now his altimeter registers sufficient altitude to clear the mountain range ahead, but he keeps on climbing for another two minutes and then flies level until the time is up that should take him to the middle of the next valley. He throttles the engine and commences an interminable glide. Will he never come out of the cloud? Suppose there is a strong head-wind at this altitude and he has not flown far enough to clear the mountain? Suppose he is coming down into the ridge? Suppose the fog has drifted in over Rock Springs? With the suddenness of a blow, the ship pops out of the cloud directly over the Rock Springs field, and 1000 ft. high.

Sights Three Beacons

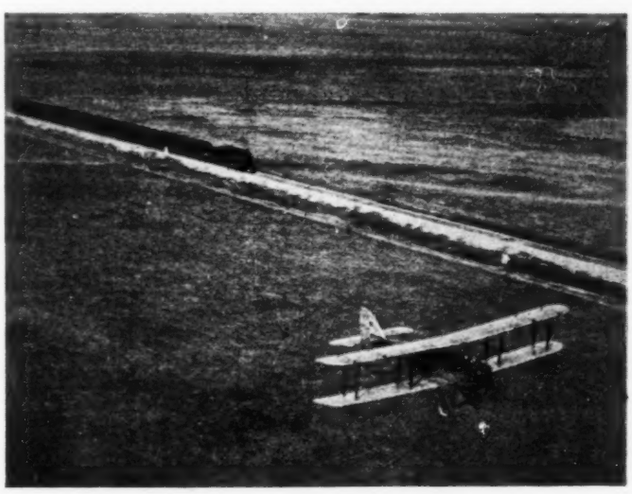
Up ahead he sees three beacons, the first 25 mi. away, the second 50 mi., and the third 70 mi. away. The snow has stopped. He opens up his engine and proceeds east. For 80 mi. the weather is fine. Then snow, so thick and so low it cannot be evaded. He goes back five miles and lands at Cherokee, Wyoming. Here he telephones every field for 170 mi. ahead and finds a peculiar condition: Clear at the first; solid fog and snow at the second; clear at the third; solid fog at the fourth; and so on. This looks easy: local snow-storms which can be flown over with safe landing possibilities at every other field. He takes off and climbs to 12,000 ft. by the time he reaches the first storm. He is just in the top of it. He climbs to 15,000 ft. as he proceeds east. This is practically the ceiling of the plane with the load of mail he is carrying. The fourth field which was clear 45 min. before, does not appear. The entire world seems enveloped in mist. The sixth also does not show up, and so the pilot decides to see if there is not a "hole" down through the fog somewhere east of his terminal, Cheyenne. With this in view, he flies east until he knows he is about over Sidney, Neb. But the ground never shows up. The moon has set and the sky is almost as dark as the storm below. Just at this moment he goes through a patch of clouds sticking above the storm-top, and rapidly a coating of ice seems to grow on the wings and wires. This added weight brings the plane down to 13,000 ft., which altitude it is just able to hold with the engine full-open. The airplane is now 2,000 ft. below the top of the fog and 3,000 ft. above the highest mountain-tops in this region. The pilot turns west with a possible two hours gas supply left, hoping to return to a clear region, or at least a "hole" in the storm.

Ice Puts Out Air Speed Meter

He looks at his air-speed meter and finds it registering an impossibly low air-speed. The ice, collecting on the air-speed tube, has put it out of commission. Thinking it quite impossible to fly under these conditions, the pilot prepares to jump with his parachute. He will turn off the gasoline-cock, letting all the gas drain out of the carburetors, pull the levers which drop the gas-tanks, cut the ignition switches, unfasten his safety belt, and climb over the left side of the cockpit, holding the stick with one hand. Then he will pull the plane back into a stall and drop overboard with one hand on the rip-cord-ring. He will count three and then pull. All this is rehearsed mentally while he is still attempting to keep the airplane level. He glances again over all the instruments in a final survey, but since they all seem normal, except the air-speed meter, he decides to stick it out a moment longer. There is no real danger until he either goes out of control, or the engine quits, or the weight of ice bears him down to the 10,000-ft. level where he may strike mountain peaks. This "moment" lasts for an hour and a half. What an interminable hour and a half! What fierce attempts to achieve perfect calmness!

He has flown steadily westward by his old Type "B" Compass. How he wishes it were better compensated, but he guesses at the proper compensation to add to his course. Then suddenly a break comes in the fog, a "hole" in the storm. He drops a parachute-flare into the abyss and, spiraling down around it, finds himself over a rough mountain-side. A sheep-herder's wagon with a lantern held in the doorway is the only sign of life. It is impossible to land because of the roughness of the ground. Deciding that this mountain does not have any characteristics of those south of the course, it seems more than likely that the plane has drifted to the north; it is, accordingly headed south. The flare has gone out but the pilot has seen that the ground slopes away into a level valley, and, by coming down to within 50 ft. of the sage-brush, he can see objects a hundred feet distant. At 115 m.p.h. this is equivalent to driving a car in a fog at 20 m.p.h. when you can see objects only 18 ft. in front of you.

The engine sputters. The right tank has gone dry. The handle is switched to the left. The engine picks up. It begins to snow. The darkness is intense,—terrible. The pilot drops to 10 ft. and puts on his landing light to show a spot of light on the ground. The light spot encounters an irregular object in the sage-brush which is gone almost as soon as it appeared. He has gone a hundred feet before he realizes clearly what it was: a range-steer, head down, tail to the storm. He now knows which direction the wind is. It was the steer's rump he saw first. He is traveling with the wind. And he had been about to land, almost blindly, straight ahead in the high sage-brush—at 85 m.p.h., minimum! A terrific crash would have been inevitable. The left tank goes



Mail plane going past the Overland Limited in Sacramento Valley.

dry. Now to the gravity tank for a possible eighteen minutes. Then? Well, he doesn't have to decide that just yet. And what is that flash up ahead? Ten seconds later comes another, and he knows it is one of his beacons, which one he cannot guess. Can he reach it in eighteen minutes? Just fifteen minutes later he lands at Medicine Bow Field. He had been 30 mi. north of the course. It is half an hour after midnight.

This case illustrates well what actually happens when the air-mail planes are caught in fog and at night, and have to get out of it, somehow. What would it be like if we had devices and adequate route facilities? Let us assume the same weather conditions:—favorable clearness changing to

dense fog and snow between the time of take off and the time of arrival over the fields from which the weather reports were sent.

In the first place the pilot will have radio communication with the ground at all times. He will then not have to guess at changes in weather during his flight, and he will know the condition of his terminal airdrome and the advisability of attempting to land there. In the second place he will have a radio beacon which will entirely eliminate (so long as it does not get out of commission) all his difficulty in keeping exactly on his course. He will probably have passengers with him so that he cannot make a 'parachute-exit', no matter what happens, unless he can first dump his passengers with automatic-opening 'chutes, or else "persuade" them to jump. But to partially offset this disadvantage, he will have a more reliable power-plant.

Ice Collection Problem Unsolved

In the next place, he will have an airplane very stable longitudinally and laterally, and a turn-indicator which cannot ever freeze up. Possibly also, he may have an electrically heated air-speed venturi which will insure safety there in case of ice-collection. We do not as yet see any satisfactory way to combat the danger of ice-collection on wings, wires, struts, and propeller. We have tried all kinds of greases and coatings, but we do not find them a sure remedy. Yet this is a serious problem. It does not always solve itself as it did in the two instances mentioned. It has often borne a ship clear to the ground, quite out of control, or with a landing-speed somewhat in excess of the maximum level speed of the ship, viz., 125 m.p.h. The result in these cases is always a complete crash.

Three years ago, one of the new pilots on the Central Division landed one night so shaken nervously that he had tears in his eyes as he told another pilot he had collected ice—his first experience with it. His friend said, "You don't have to tell me about it. Just that one word, ICE, and I know what you've been up against." He was cheered up and he insisted on going on to complete his trip. That was the last he was seen alive. Half an hour later he was caught "blind" in a snow-storm. He was so unnerved by his recent ice-experience that he pulled his parachute rig too soon after jumping, and the parachute got entangled in the airplane's tail.

"Ice" is a rare occurrence, perhaps averaging but twice or thrice a year for each pilot, but when it comes it must be met instantly and aggressively. With passengers aboard the solution seems a long way off. Perhaps the solution is: to refuse to carry passengers whenever there is a remote possibility of "ice".

Air Accurate Altimeter

As a fourth improvement the transport airplane will have an altimeter indicating the exact height above the ground,—such an instrument as the new capacity altimeter. The pilot can, with these devices, fly through fog to his terminal airdrome. He can circle over the field even though he cannot see it, and he will be able to tell, within a few miles, where its boundaries are. Such flying is still highly problematical and is done, if at all, very rarely. Experimental, simulated "blind flying" in an enclosed cockpit, with another pilot along ready to rescue the airplane from unintentional spins or from loss of control, has been successful to a certain degree—largely, perhaps, in the direction of showing near-pilots and ground personnel, how extremely difficult and dangerous such flying is. Its application to service conditions, both in military and civil aeronautics, is fraught with such great possibilities of loss of life, that it has never been deemed advisable. It seems, however, that, theoretically, nothing stands

J. F. Baker, (left) general manager of the American Railway Express handing some of the express packages in the first air-express shipment to Pilot Maurice Graham of the Western Air Express.

in the way of achieving it if all available modern devices were pressed into service.

Let us suppose a situation, such as that on the stormy night mentioned, in which the pilot flew over Cheyenne Airport but was unable to land there. The fog and snow is impenetrable from the ground (altitude 6200 ft.) to 15,000 ft. The 36-in. 500,000,000 c.p. beacon directed upward, and all the field and city lights, fail to give the pilot the slightest indication of the location of Cheyenne. The beams are absorbed and diffused within a short distance of the ground. The pilot will know from his radio communication with the Cheyenne station that he is directly over the field. His new altimeter tells him his height above the ground with such accuracy that he can safely come down to within 500 ft. of the field. He has, let us say, been given the wind direction by radio and he will manoeuver so as to fly directly into it as he approaches the landing place. At 500 ft. altitude he will be safe from the danger of hitting tall chimneys, radio towers, etc., with still a small margin in case of side-slips, stalls, or inaccuracy of the instruments. Unless the fog is very dense he will be able to locate the field light as he passes over them. But, consider his problem in case he cannot see any lights.

Travels 146 Ft. Per Minute

He is concentrating on the one task of flying level laterally and longitudinally and keeping on a straight course, concentrating harder than many untrained people are capable of doing at all. At the same time he must control his altitude to within very close limits. This is of vital importance, since an error here may mean that for him the universe suddenly ceases to exist. All the time he is traveling, let us say, at 100 m.p.h.—146 ft. every second. Many engineers who, at their desks, or even as air passengers, on clear days, figure out devices and programs for "blind landings", are in no position to appreciate the magnitude of the task which confronts the pilot. A task involving the purely physical factors, the physiological and psychological ones, such as an accurate simultaneous perception of some fifteen instrument indications, and the skillful manipulation of airplane controls about three perpendicular axes in accordance with the instrumental indications, and at the same time keeping the nervous and organic processes of his own body in hand. Successful solution of the problem will have to take practically into account the fact that for the pilot the entire situation is colored by the ever-present realization that an error of ever

so little in one of his instruments as well as an error in judgment on his part may have the most appalling consequences for all concerned.

The pilot is traveling "blind" at 146 ft. per second—not much less, ever, if he expects to have a margin of control. It takes some seconds to get everything straightened out and his instruments checked, but by this time he has passed beyond the field, even though his flight-path did happen to pass directly over the landing place—a bare coincidence. He returns, climbing to a safer altitude, and tries again. Perhaps the radio beacon is swung around to give him his line of landing, or a line parallel to it, for presumably the radio loop tower will not be portable so that it can be taken to the other side of the field in case the wind shifts. Up this beacon-line the airplane can be flown, the pilot gradually decreasing altitude in proportion to his distance from the landing spot. Again, remember, he has the same problem over again in flying straight and at the proper height. Let us assume that this time he hits exactly the correct flight-path for the landing. Now, of those points at one second intervals at which he can throttle his engine for a glide into the field, only ten will be safe from the point of view of under-shooting or over-shooting. Suppose he flies "engine on" to within a few feet of the ground, avoiding, as by some sixth sense, all obstacles, and is then given a signal by radio, or high-tension ground cable, or fog-piercing lights, when to throttle for landing. The chances, even so, for timing the affair exactly are desperately slim.

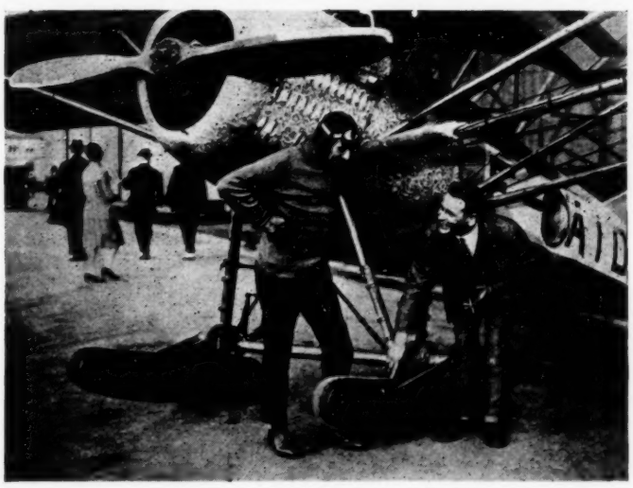
Much Left to Pilot's Skill

The time is not far distant when aeronautical engineering will recognize that the equipment of airways, terminal fields, and airplanes, for safety in bad weather is not only necessary, but quite as possible and feasible as the safety devices on railway systems and ocean lanes. And when we envisage the fact that even in the absence of such equipment, certain regularly established air lines, such as the United States Transcontinental, which was referred to by a distinguished European expert as "the marvel of the aeronautical world", have carried on with a high degree of efficiency through day and night and fog, we will realize how much of the actual solution of the task has been left to the pilot's skill. Our analysis indicates that the task is two-fold, and that the time, too, is fast approaching when the scientific attack upon the problem of the relationship of the human organism under conditions of stress to this task, becomes imperative,—a task involving the cultivation (1) of an unusual sensibility to such a complex system of indicators as was described above, (2) of a capacity of judgment and discrimination in space and time relationships, disentangled from reflex judgments of the human organism, and (3) of exquisite skill and precision in manipulation of controls, which, too, must be freed from many reflex tendencies called out inherently by the situation. Such an attack will lead, if we are truly in earnest in the matter of efficiency, to a program of education and training that is as essential for making the air safe as is the mechanical equipment of the airplane.

The situation is very complex, involving not only instruments both accurate and readily interpretable under conditions of stress, but also careful training in this particular technique,—a training that is rare because it is so dangerous.

We must, I think, conclude that such "blind-landings", or, let us call them, "head-in-the-cockpit landings," remain a matter for the experimental field for some time to come and are still a long way from practicability on a restricted airdrome. Such devices as high-tension lead-in ground-cables with capacity distance indicators on the instrument-board, are, at best, for use on a very large landing field. Such things as trailing ground-contact devices for self-leveling and automatic motor-throttling, come under a similar classification. We must rely, until great improvements are made in airplanes themselves, or until we have more practical devices than at present, on something which we can see when we get so close to the ground that collision with obstacles might possibly occur. With fog-penetrating lights (if there really are such things) placed to form a pathway for landing, a pathway that is visible from a reasonable altitude in dense fog and is movable to accommodate the wind-direction, we can, even now, effect safe landings—given the radio communication, the radio beacon, the capacity altimeter, stable airplanes, and our present turn and bank-indicator. All these devices, with the possible exception of fog-penetrating lights, are proven and practicable.

For Mud Landings



(International Newsreel)

Picture taken in Paris shows Pierre Chevreau, right, explaining his newly invented landing gear, of the caterpillar type, to his pilot, M. Peuillox, who flew the plane in a recent test flight.

Begin Work on Airway Lighting

WITH THE approaching completion of the Salt Lake-Pasco airway survey the Airways Division of the Aeronautics Branch has been enabled to begin the preliminary work on air lighting of the transcontinental route west of Salt Lake City, the Department of Commerce announced recently. This is the only unlighted link from the Atlantic to the Pacific.

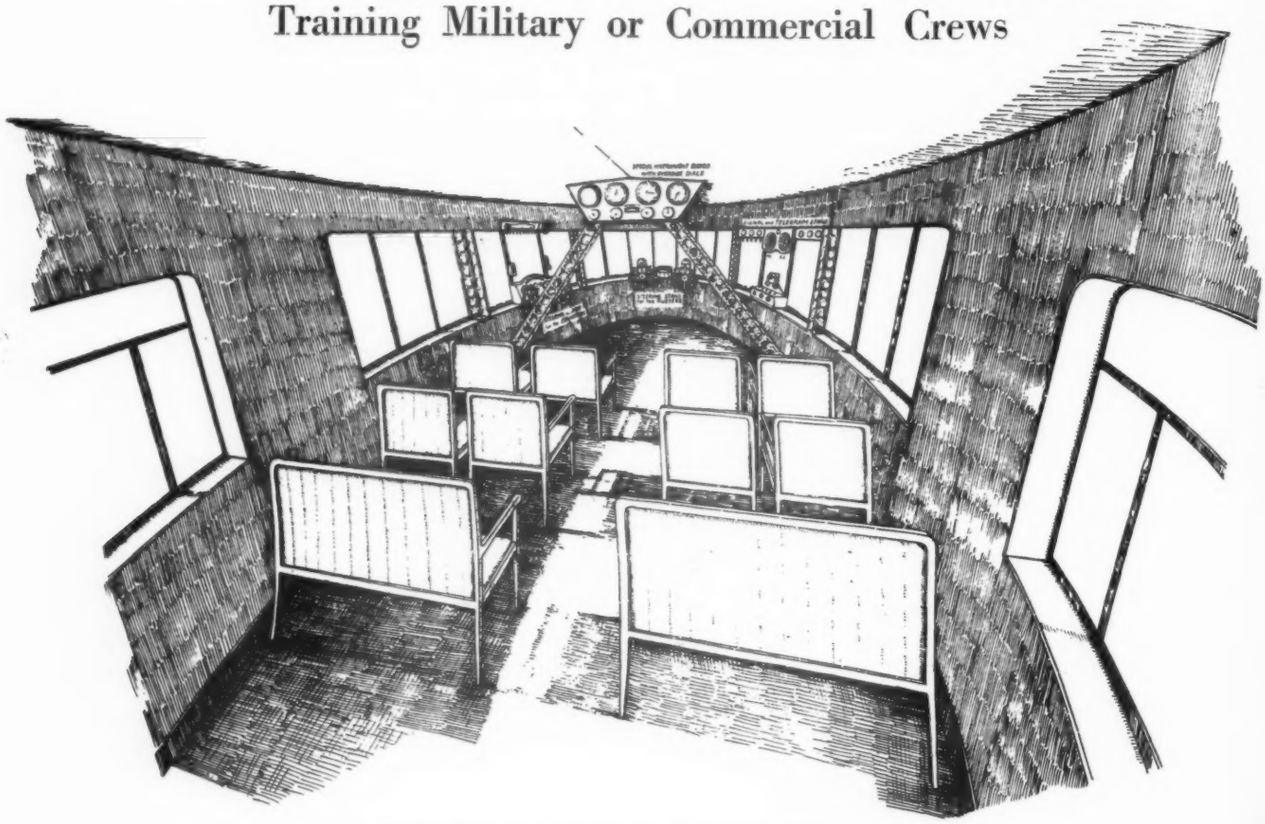
An attempt is being made to have telephone communication available at all fields south of Burley, Idaho, on the Salt Lake-Pasco air route. This communication is considered very important by the Department because it will give pilots accurate information on weather conditions ahead. The mountainous character of this section makes weather reports essential for the safety of pilots it is said.

U. S. National Museum Handbook

OWING TO the great interest being taken by the public at the present time in air craft, the Smithsonian Institution, Washington, D. C., has recently published a handbook describing the notable collection of historical machines now on exhibition in the U. S. National Museum, under the title, "Handbook of the National Aircraft Collection Exhibited in the United States National Museum, under the Direction of the Smithsonian Institution".

A "Flying Schoolhouse"

Goodyear-Zeppelin Corp. Engineers Design Craft for Training Military or Commercial Crews



Drawing of the "flying schoolhouse" class room.

By WALTER E. BURTON

A FLYING SCHOOLHOUSE" for the training of future airship crews has been designed by the engineering staff of the Goodyear-Zeppelin Corp., of Akron, O., as one of the steps in the preparation for the day when dirigibles will be one of the principal means of swift transportation of passengers and freight.

The proposed training ship will be suitable for the preparation of either military or commercial dirigible crews. It will be about a third the size of the Los Angeles, and can be filled with either helium or hydrogen gas. A double cabin will be provided. The forward portion of this will be occupied by the ship's navigators, while the rear section will be the principal classroom, with desks for sixteen to eighteen students. Large instrument dials, visible from all parts of the classroom, will enable students to follow every movement in connection with the navigation of the ship, and the reaction of the craft to various conditions.

The trainnig dirigible, while comparatively inexpensive, will be large and fast enough to afford navigating experience identical with that obtained on a full-sized craft. It will have a maximum speed of about 80 m.p.h., and a cruising speed of 65 m.p.h. It is not intended for long distance flying, although it is stated that it could be quickly remodeled into a military ship for coast patroling or other duties in event of a national emergency.

A new type of girder construction, producing greater thickness of cross-sections and giving added strength against possible corrosion, local damage, and high stresses, has been worked out in connection with the planning of the training ship. Internal corridors will make all parts of the craft accessible during flight. A fabric outer cover, coated with an aluminum preparation or paint, will be fireproof, weatherproof, and resistant to such local stresses as would be caused by hailstones and minor accidents.

No Substitute for Actual Experience

The designers of the proposed training ship point out that, in the operation of the dirigible, there is no substitute for actual experience any more than there is in the operating of an ocean steamship or other large craft. Students of airship operation must have, of course, a complete theoretical knowledge of the problems of balance, buoyancy, ballast, power, fuel, meteorology, landing technique and the like; but this must be backed by actual experience before the training can be considered complete.

Such training is a progressive process. It begins first in the classroom on the ground, where the fundamentals of flying are taught. The student next gets his first air experience in a free balloon. Following this comes the little blimps

which provide experience with gas-filled craft driven by a motor and guided by rudders. Finally, the training ship will provide the finishing touches to the thorough training necessary for the safe and efficient operation of a giant air liner, such as the Los Angeles or the proposed super-dirigibles. The training dirigible is intended to provide facilities for training work in America similar to that pursued in Germany before the World War.

When Count Zeppelin conceived the idea of establishing regular airship service between Germany and America, across the Atlantic—a plan which was interrupted by the World War—he realized the necessity of highly-trained crews for the operation of the ships.

Theoretical Flights Conducted

Accordingly, Dr. Hugo Eckener, head of Delag, the commercial airship subsidiary of the Zeppelin Corporation, conducted a school in theoretical flying, supplemented by actual air experience. This was in 1912. The procedure was somewhat as follows:

Dr. Eckener summons a cadet commander.

"You will take the ship Z-17 from Frederichshafen to New York, starting as of March 4, 1905," he orders.

The cadet commander immediately assembles his student crew, and begins a detailed study of weather conditions existing over the North Atlantic during March 4, 5 and 6, 1905. Count Zeppelin, in his elaborate preparations for trans-Atlantic flying, had set a group of men to work collecting weather data along the proposed route over a period of twenty-five years. Logs of about 1,000 ships and records of weather bureaus in America and Europe provided the information sought. So when the student commander and his crew assembled in a closed class room for the theoretical flight, they knew pretty well what weather would have been encountered in a flight starting March 4, 1905.

The future Zeppelin operators remained in their imaginary airship quarters during the entire "voyage", standing regular watches and performing other duties which would have been encountered on such trip. Their meals were sent to them.

Over 1,000 theoretical flights were made in this manner from Friedrichshafen to New York and return before war came. Graduate airship captains as well as students took such training, in preparation for what was expected to come.

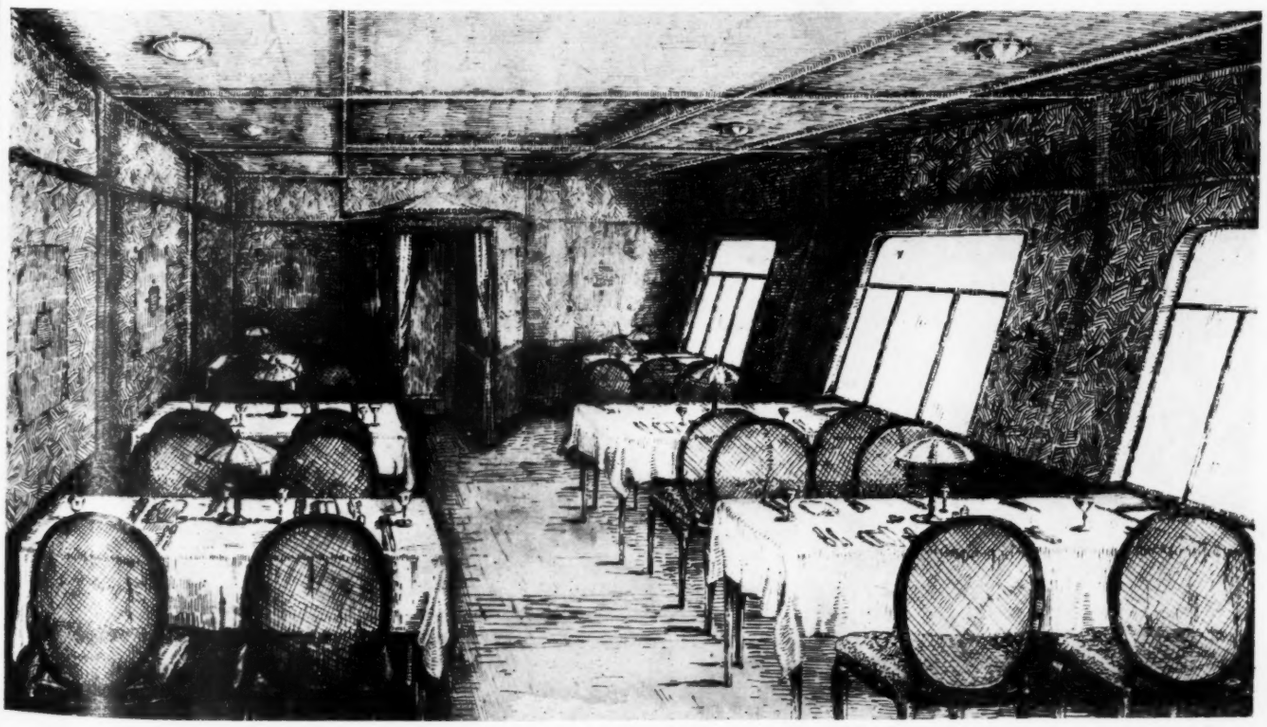
This illustrates the manner in which commanders of air liners of the future will be schooled in the details of proper dirigible navigation. Although no immediate provision for the building of a training airship has been made, the designers are confident that such craft will come into general use within a comparatively few years.

New Air Mail Stop To Be Lighted

ADDITIONAL LIGHTING will be provided by the Department of Commerce for the new air mail stop at Madison, capital and seat of the University of Wisconsin, on the Chicago-St. Paul-Minneapolis airway. The new lighting will extend from Watertown down to Madison and thence to Portage where it will join the original route. This means about 67 mi. of additional lighting. The City of Madison has obtained options on a field about five miles out of the city and is taking steps to purchase 290 acres for the landing field. A concrete state highway is being built along the eastern boundary of the proposed airport.

Location of Fields Difficult

CONSIDERABLE DIFFICULTY has been experienced in the location of landing fields on the Los Angeles-Seattle airway because of its mountainous character and abundant timber land, states a report from the Aeronautics Branch of the Department of Commerce. The aerial survey of the airway is now nearing completion and the general course of the route tentatively determined.



A drawing of the messroom on the "flying schoolhouse" designed by the engineers of the Goodyear-Zeppelin Corp. of Akron, O.

The Arens Control

A Control Mechanism Designed to Replace Bell Cranks And Yet be Light, Positive and Reliable

THERE HAS always been a long felt need among aircraft designers for a control mechanism that would replace the well known bell crank and yet be light, positive and reliable. Some time ago Charles Arens of Chicago, Ill., developed a very simple mechanism that is being rapidly adopted by many of the leading aircraft manufacturers. The Arens patented control is in use on the Boeing mail planes, Stinson-Detroiter, Laird biplane, Yackey monoplane, Keystone airplanes, Curtiss "Condor", Ireland "Neptune" and many others. The action of the control varies but it is equally effective whether applied to engine controls, ailerons, brakes, stabilizer adjustment or bomb releases. The mechanism which eliminated bell cranks or universal joints for transmitting controlling forces around corners requires practically no maintenance and permits the use of a solid fire wall.

In external appearance this control consists of a brass sleeve of any desired length and bent to any desired shape, from each end of which projects a snug-fitting tube, threaded

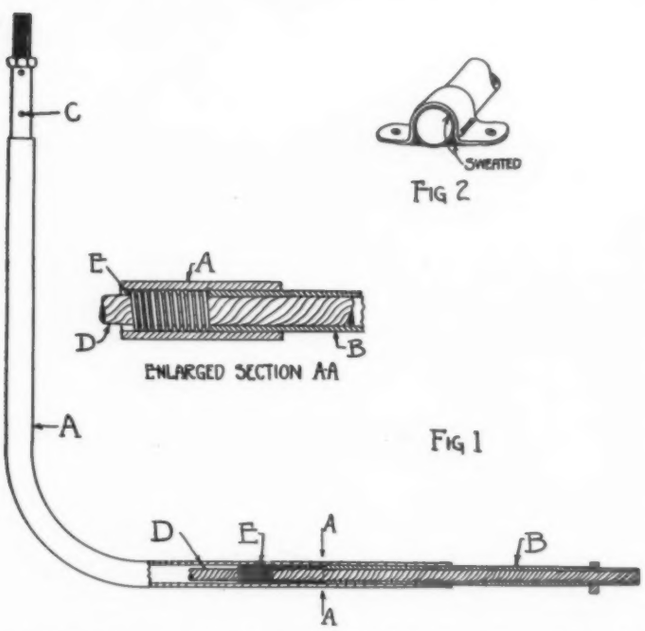


Fig 1

Fig 2

at the end to receive the control rod leading from the cockpit. The length of the brass sleeve or the number of bends in it make no appreciable difference in the operation of the control. There is no lost motion. The letter "A" in Fig. 1 denotes the brass sleeve or casing, the letters "B" indicate the tubes which freely slide in casing "A". These tubes contain solder holes "C" for the purpose of inserting solder, and screw threads are located at the ends. A flexible ⅛ inch diam. 7 x 19 strand steel cable "D" is inserted inside the tubes and the casing, and soldered to the tubes by means of solder holes "C". Between the ends of the tubes and within the casing, so that it surrounds cable "D" there is inserted a spiral steel spring "E" which is closely wound before insertion.

When a tensile force is applied in one of the tubes "B" the force is transmitted through cable "D" to the other tube and when a compressive force is applied it is transmitted

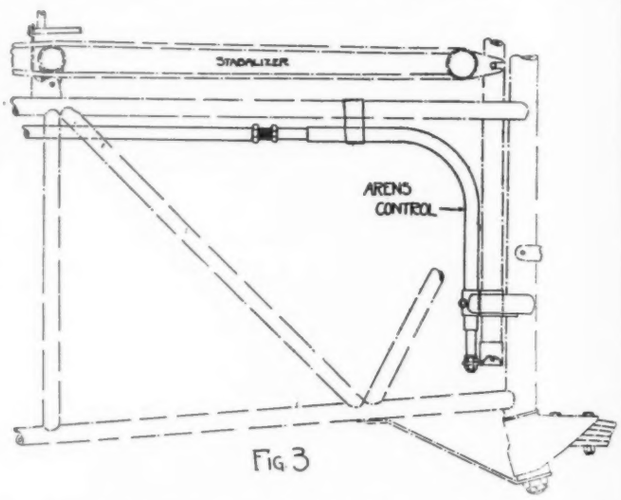


Fig 3

through the spiral spring "E". This spring being already under complete compression will not be further compressed under the load. The rigid character of casing "A" enables these operations to be easily performed with no yielding under the strain produced. The angle of transmission may be any desired angle though it is usually about 90 deg. There is no lateral movement of any part so that any connections through the fire wall can be made tight fitting. Generally the control is fitted around the fire wall rather than through it.

Arens controls are manufactured in two sizes, the ¼ in. and the ⅜ in., each denoting the diameter of the steel tube "B". The ¼ in. size is generally used for engine controls such as throttle and mixture or brakes while the ⅜ in. size is used for ailerons or adjustable stabilizers.

The entire mechanism is assembled with grease but to provide for lubrication, the ⅜ in. controls are equipped with Alemite connections whereas the ¼ in. ones simply have a small hole to receive the oil. However, lubrication is rarely if ever needed. Using oil of constant viscosity enables the mechanism to work equally well in all temperatures.

The connections leading to the Arens controls consist of the conventional steel tube rod with a threaded bushing in the end which attaches to the control. The control is locked to the rod by check nuts.

Several methods of mounting the control are being used, the most common probably being a flanged "U" shape fit-

ting which is sweated to the casing at two or more points as shown in Fig. 2.

The control has been adapted for adjusting a stabilizer setting on the Yackey monoplane where the absence of bell cranks is especially noticeable. Fig. 3 shows how the control raises or lowers a rod which in turn moves the stabilizer. The engine controls on the two Laird biplanes that won first

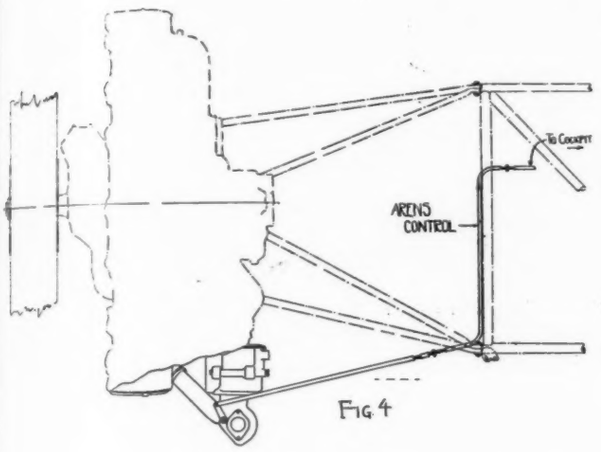


FIG. 4

and second in the National Air Derby were built by Arens. On the later Laird planes Arens type aileron controls were adapted. Fig. 4 shows the aileron and intake manifold control on the Laird biplane.

Several large airplane manufacturers have made exhaustive durability tests in machines built for the purpose and it is stated that in no case has the control failed to give complete satisfaction. Its strength by actual test is generally superior to the other parts of the control system and its weigh no greater than the relatively complicated bell cranks which it replaces.

Union Trust Co., of Detroit, Mich. Purchases a Waco Ten Airplane

"TRUSTY" IS the name of the new biplane purchased by the recently established aviation department of the Union Trust Co. of Detroit, Mich. The biplane, piloted by Capt. "Ray" Collins, arrived at the Ford Airport recently. The Union Trust Co. is stated to be the first financial institution in the United States to establish a regularly authenticated aviation department and to make practical use of air service in its business. The company is fortunate in being able to command the services of so well-known an aeronautical expert as Ray Collins. The establishment of the aviation department is simply a continuation of the interest which the Union Trust Co., particularly its president, Frank W. Blair, has taken in aviation advancement and progress in Detroit.

Celebrities Greet Captain Collins

The new plane is a Waco 10 and a duplicate of the plane which recently won the Class B. first prize in the New York to Spokane derby. Charles Meyers was the pilot of the Berry Brothers biplane which was successful in that event. It was made by the Advance Aircraft Corporation of Troy, Ohio. It is a two-passenger, open cockpit plane and is equipped with an OX-5 engine.

When Captain Collins arrived at the Ford Airport, he was greeted by a reception committee, which was headed by President Blair and a large group of other officers of the Union Trust Company of Detroit. Among his aviation friends who were on hand were Capt. "Eddie" Rickenbacker, "Billy" Brock, W. B. Mayo, Edward Schlee and William B. Stout, all well-known names in Detroit aviation development.

When questioned relative to the utilization of the airship for practical purposes in the banking business, President Blair explained that the officers of the Union Trust Company have found so many opportunities to take advantage of the membership of Mr. Blair in the "Wise Birds" flying group that he found the calls on the two planes owned by the "Wise Birds" organization so frequent as to suggest the inadvisability of a new plane for the Union Trust officials, themselves.

Jupiter Engine Successfully Completes 100 Hour Test Run

A REPORT received from the Bristol Aeroplane Co., Filton House, Bristol, England, states that an officially observed non-stop run of 100 hr. was recently completed with a Jupiter engine constructed under license in Italy by the firm of Nicola Romeo and Co.

Before the engine was placed upon the test bed for the 100 hr. test it had carried out the ordinary tests called for in Italy, namely, five continuous hours of which the first hour was run at 420 hp. at 1700 r.p.m. and the remaining four hours at 380 hp. at 1640 r.p.m. The engine was then dismounted and inspected and after remounting carried out an acceptance test of half an hour at 420 hp. at 1700 r.p.m.

The 100 hr. test was commenced on July 25 at 7:30 A.M. During the first hour the engine was run at 420 hp. at 1700 r.p.m. and at 8:30 A.M. the throttle was reduced and the engine developed 378 hp. at 1640 r.p.m., that is to say, 90 per cent. full power. For the remaining 99 hr. the throttle was not touched again and the number of revolutions per minute remained constant throughout the period.

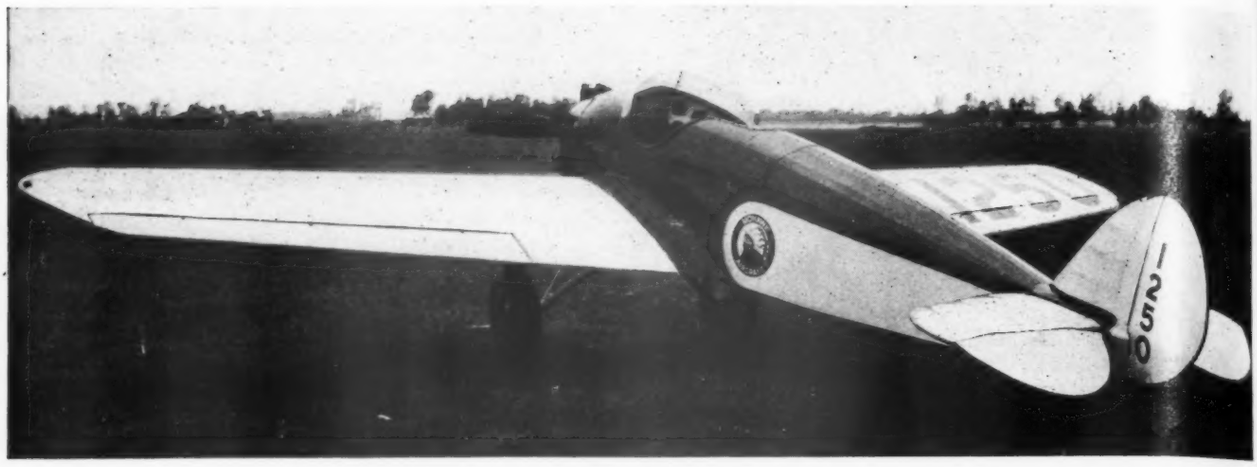
The temperature of the oil was maintained at 40-45 deg. at the inlet and 80-85 deg. at the outlet, while the consumption was normal throughout the period, the gasoline consumption being .5 to .507 lb. per hp. and oil .035 to .044 lb. It was to be expected the oil consumption during the early periods of running was higher than at the end of the test. While doing the first hour at 9/10 power the consumption was about .0485 lb. per hp. hr., and during the last hour .042 lb. per hp. hr.

During the whole period of 100 hr. the running was entirely normal and everything worked perfectly. The engine was then dismounted for inspection as to the condition of wear of the various parts, and everything was found to be in perfect condition.

Varnish Firm Studying Industry

THE BASS-HUETER Paint Co., of San Francisco, Calif., the oldest paint and varnish manufacturing firm in the Far West, is studying the aircraft industry carefully in order to better serve the manufacturers of aircraft in its part of the country. The aeronautical activity on the west coast is rapidly expanding and some of the most active aircraft manufacturers are in that section.

The Boeing Airplane Co. of Seattle has used Bass-Heuter varnishes for a number of years. In the buildng of its fleet of mail planes which are now being used on the Chicago-San Francisco route, Bass-Heuter varnishes were used. Another more prominent user of this varnish is the B. F. Mahoney Corp., builder of the Ryan Brougham.



Rear quarter view of the Mohawk "Pinto".

The Mohawk "Pinto"

A Full Cantilever Low Wing Monoplane Powered With a Detroit Air-Cat 60 Hp. Engine

EARLY THIS year the Mohawk Aero Corp., of Minneapolis, Minn., started construction on a low wing two place monoplane that was recently completed. Following a considerable number of test flights the company was reorganized under the name of Mohawk Aircraft Corp., and production has been started on this plane, the Mohawk "Pinto". It is a full cantilever low wing monoplane powered with a Detroit Air-Cat 60 hp. engine. The two-place fuselage, with the seats slightly staggered, is built of welded steel tubing, while the wings are of wood, with the entire structure covered with fabric.

High Speed of 110 M.P.H.

The plane has very clean lines, being free from all external bracing, giving good visibility from either cockpit. According to the figures supplied by the manufacturer the Pinto has a remarkable speed range even with full load, making possible slow landings and short take-offs. It has a high speed of 110 m.p.h., with a landing speed of 35 m.p.h. It is often stated that the low wing monoplane causes a cushioning effect due to the proximity of the wing to the ground. It has been stated that the plane will take off with a run of 150 ft. and with full load climb at 800 f.p.m.

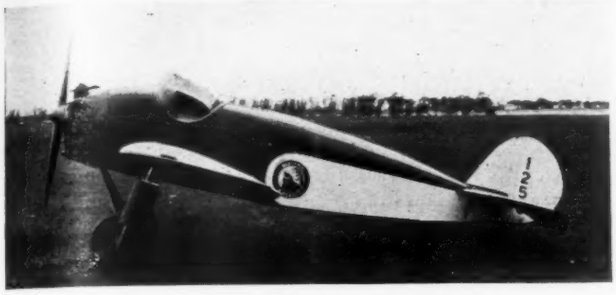
The wings taper both in chord and plan, and have a definite dihedral to provide stability with the lifting surfaces set so low. Both front and rear spars are of box section with spruce flanges. The webs are of two ply mahogany with a spruce bulkhead every 14 in. The spars are not parallel, coming closer together toward the wing tip with ribs spaced approximately every 12 in. Ribs are built up with spruce capstrips and three three ply mahogany webs. A spruce stiffener is used to reinforce the web for the compression ribs, drag forces and torsion being taken up by double wire bracing. The leading edge is reenforced on top and bottom with three ply mahogany in front of the forward spar. The ailerons are controlled by a torque tube through the wing. They are of the Fries type having a slight lip on a lower leading edge which gives a balancing action. It is claimed that these ailerons are very effective even at stalling speeds. By removing four pins one at the top and the bottom of each spar, the wings can be quickly taken off to store the plane in an ordinary garage. The aileron control is automatically detached when the wing is removed, and vice versa, when attached to the fuselage. The wings have been tested by distributing a load of 3,000 lb. over each wing.

The fuselage is of welded steel construction with no wire bracing. On the nose, mounted on a welded steel frame is the 60 hp. Air-Cat engine in front of the main fuel tank which feeds gasoline to the engine by gravity. The engine is well cowled being provided with a spinner fitting into the streamline shape of the fuselage. Behind the engine compartment and above the wing is a cockpit with two seats, the pilot's seat being slightly forward and to the left of that for the passenger. It is claimed that this arrangement has all the advantages of seats in tandem with combined convenience of the side by side arrangement. A large windshield ex-

Front view of the Mohawk "Pinto".

tends around the cockpit making it practically free from the effect of the slipstream. A single control system has been installed using the conventional stick and rudder pedal control system with all the control wires entirely within the fuselage, keeping the cockpit free. Just behind the pilot's seat and beside the passenger is a compartment for tools or any other equipment, while baggage may be stored in a separate compartment.

The undercarriage is of a split axle type with a tripod truss, the compression member being connected vertically from the axle to the forward wing spar. A combination



Side view of the Mohawk "Pinto".

pneumatic and oleo shock absorber is used which absorbs the shock with a minimum of rebound. The 26 in. wheels are placed six feet apart giving the plane very good stability when taxiing. The tail skid is of a leaf spring type.

The manufacturers specifications are as follows:

Wing span	30 ft. 6 in.
Length overall	20 ft. 2 in.
Height overall	6 ft. 3 in.
Chord of wing at root	5 ft. 6 in.
Chord of wing at top	5 ft. 3 in.
Wing area	124 sq. ft.
Wing section	U.S.A. 35 modified
Weight empty	700 lb.
Disposable load	500 lb.
High speed	110 m.p.h.
Cruising speed	90 m.p.h.
Landing speed	35 m.p.h.
Climb	800 f.p.m.
Cruising range	4 hr.

The Mohawk Aircraft Corp. was organized with Leon A. Dahlem, president; and Sumner E. Whitney, treasurer. The Pinto was designed by Wallace C. Cumming and flight tested by George A. MacDonald.

Install 100 New Airway Beacons

ONE HUNDRED additional new airway beacons have been installed by the Department of Commerce at Washington along the regular transcontinental airway between Chicago and St. Paul, and also along the New York and Atlanta airway. This group follows a similar installation of 100 which were needed previously for these two airways. They have been placed at intervals of ten miles along the route.

These beacons, furnished by the General Electric Co., are the 24-inch revolving type, which has now become the standard for the airways maintained by the Department of Commerce. They have a beam candlepower of 2,000,000 when used with a 1000-watt, 115-volt incandescent lamp. The beacons are equipped with an automatic lamp changer, a device which upon the failure of one lamp automatically puts a similar lamp in place. A flashing mechanism which is used to produce the characteristic flashing signals sent out by the on-course lights on the airways is also part of the equipment.

Elgin National Watch Co., is Now Producing New Instrument Board

THE ELGIN National Watch Co. of Chicago, Ill., is now producing an airplane instrument board, known as Type TA, containing an Elgin Chronometric Tachometer, Army Type C altimeter, oil pressure gauge, oil temperature gauge, and an Elgin 30 hour clock. It also includes an ammeter for air-cooled engines; should the board be used in connection with a water-cooled power plant a water temperature gauge replaces the ammeter. The type board is directly lighted with a two candlepower Mazda lamp. The purpose of the direct lighting is to make the board visible at all times. Often when warming up an engine at night on a brightly lighted field, or just at dusk, the luminous dials are not effective. At such time auxiliary direct lighting is valuable. Control boards of the above type have been ordered by the E. M. Laird Airplane Co. of Chicago for some new planes that it is building. A similar board has been installed for experimental purposes on a Ryan Brougham by the B. F. Mahoney Aircraft Corporation.

The Elgin National Watch Co. manufactures two other types of boards. These are both indirectly lighted. One contains a tachometer and two other gauges and the other a tachometer and four other gauges. One of these boards is being used by G. S. Ireland Aircraft Co. of Garden City, Long Island, on its new amphibian. The entire bezel of these boards is chromium plated in order to assure full and uniform luminosity. The weight of the entire board with fifteen feet of capillary tubing for the oil temperature gauge is 5 pounds and 10 ounces. The unit type instrument boards such as these described speed up production as a greater division of labor is possible. The individual instruments can be placed in the unit control board and then this board placed in the cockpit with one operation. The only remaining operation necessary is to connect the instruments.

White Boundary Markers Adopted

A THREE-FOOT circle of crushed rock or similar material white-washed has been adopted by the Airways Division of the Aeronautics Branch in marking boundaries of all intermediate fields on airways for daylight flying according to the Department of Commerce.

Work on this boundary marking has recently been begun by the Division. All intermediate fields of the Department of Commerce along the lighted airways are outlined by boundary lights on standards. Around the base of each of these standards is the circle of white-washed stone. Where the airway is now flown only by day the same white circle boundary markers will be used but without the light standard.

New C.A.T. Chief of Operations

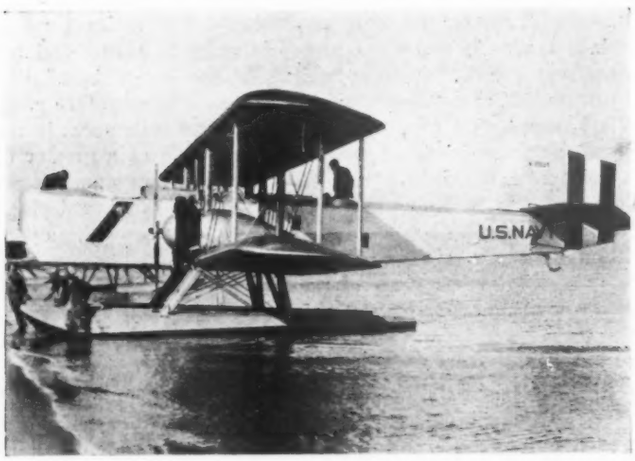
COLONIAL AIR Transport, operating the air mail and passenger line between New York and Boston announced recently that Capt. Dudley E. Rowland has been appointed Chief of Operations on this system, succeeding Lieut. LeRoy H. Thomson, deceased.

Captain Rowland is late of the U. S. Army Air Corps, having been actively identified with aviation activities since 1917. He has had over 2500 hours in the air as a pilot and is widely known in aviation circles. While an officer of the U. S. Army Air Corps, Captain Rowland held various positions of administrative importance, including Executive Officer at Kelly Field, Tex.

The Douglas T2D-1

All Duralumin Three Purpose Convertible Navy Plane Powered With Two Wright "Cyclone" Engines

A SHORT time ago the Douglas Co. of Santa Monica, Calif., built three experimental all metal, shipboard, convertible airplanes for the Navy. The model XT2D-1, or T2D-1 as it was recently re-designated, is an all duralumin three place biplane with folding wings. This model is known as a three purpose plane and may be used for bombing, torpedo and scouting service. The first two experimental models were powered with two Wright P2 435 hp. engines. Recently the Navy Department placed an order for nine additional planes of this type with slight modifications to improve the operation of these airplanes from airplane carriers. The later models are to be powered with two Wright R-1750 Cyclone air cooled radial engines developing 525 hp.



Side view of the Douglas T2D-1 fitted as a seaplane.

The structure is designed to permit catapulting either as a seaplane or a landplane. Provision is also made for deck landing on aircraft carriers and it is believed that this is the first large twin engine plane ever used for deck landing.

The airplane structure consists of metal wings and all-metal fuselage. The metal construction is of duralumin. The wings are fabric-covered and are designed to fold, hinging about a rigid center section. Jury struts are used to support the folding portion of the wing in its position. Ailerons are provided on both upper and lower wings. Interplane struts are of aluminum alloy streamline tubing and are readily removable for stowage. All external brace wires are streamline form.

The tail units are of metal construction and covered with fabric.

The fuselage is constructed of duralumin tubing, with fittings of the same material and of high tension steel. The engine nacelles are constructed of aluminum alloy and are carefully streamlined and faired into the upper surface of the lower wing. The nacelles are metal covered and are readily accessible for inspection and repair of the power plant. Steel three-blade propellers are used. An oil tank is provided in each engine nacelle. All fuel tanks are contained within the fuselage and are made of aluminum.

Provision has been made for the installation of both wheel and float type landing gear. The wheel type landing gear consists of two wheels equipped to take 36 in. by 8 in. tires and tubes.

The float type landing gear consists of two metal floats and necessary struts and wires. The floats are constructed of aluminum alloy and are so designed as to be interchangeable right and left.

Pilot's Cockpit Roomy and Comfortable

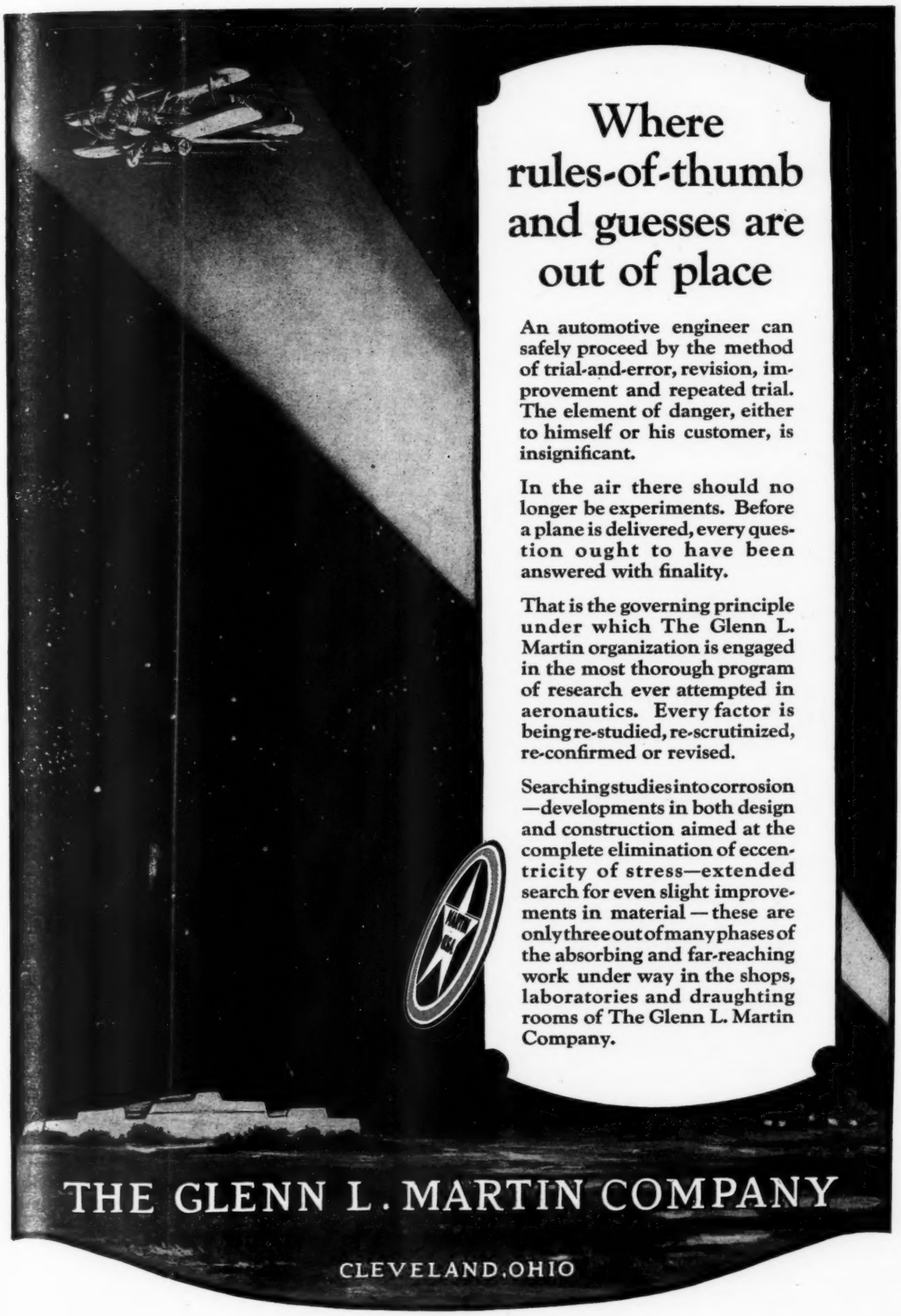
One set of surface controls is provided in the pilot's cockpit, together with all necessary flying and power plant instruments. The pilot's cockpit is roomy and comfortable in spite of the large number of controls necessary for the operation of an airplane of this type. A bomber and gunnery compartment is provided in the bow of the fuselage with access from the pilot's cockpit. A radio compartment and a rear gunner's cockpit are provided in the after portion of the fuselage.

Provision is made for carrying all necessary ordnance equipment, including flexible guns, bombs, and a torpedo either as a seaplane or a landplane.

Front quarter view of the Douglas T2D-1 fitted for land service.

The radio compartment is equipped with a long range scouting radio set.

Particular attention has been given in locating the pilot to facilitate landing aboard an aircraft carrier. Successful landings have been made with this type airplane aboard airplane carriers, although it is the largest airplane landed in this manner.



Where rules-of-thumb and guesses are out of place

An automotive engineer can safely proceed by the method of trial-and-error, revision, improvement and repeated trial. The element of danger, either to himself or his customer, is insignificant.

In the air there should no longer be experiments. Before a plane is delivered, every question ought to have been answered with finality.

That is the governing principle under which The Glenn L. Martin organization is engaged in the most thorough program of research ever attempted in aeronautics. Every factor is being re-studied, re-scrutinized, re-confirmed or revised.

Searching studies into corrosion—developments in both design and construction aimed at the complete elimination of eccentricity of stress—extended search for even slight improvements in material—these are only three out of many phases of the absorbing and far-reaching work under way in the shops, laboratories and draughting rooms of The Glenn L. Martin Company.

THE GLENN L. MARTIN COMPANY

CLEVELAND, OHIO

Side Slips

By ROBERT R. OSBORN

According to the news, the group of prominent aviators who flew the Atlantic this last summer, including Colonel Lindbergh, Commander Byrd, Schlee, Brock and Chamberlin, are to meet in Washington for the purpose of correcting the "errors and misstatements" appearing in a report "Analysis of Weather Conditions on Recent Trans-Atlantic Flights" written by two Navy officers. It certainly is not any great surprise to most of us to find that our weather experts cannot discuss the weather accurately even after it has occurred.

• • • •

Miss Ruth Elder is quoted as having said to the crowd which was seeing her off, on her trip back to the States,—"There is only one thing in the world that interests we now—flying the Atlantic." Apparently the aeronautical "we" has become as much of an institution as the editorial "we".

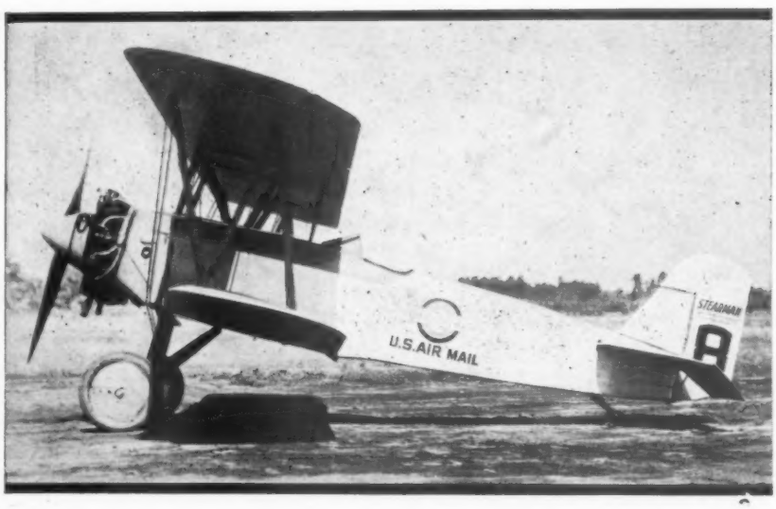
• • • •

In a news article in the Sunday edition of one of the New York papers we find, "—one of the big three-motor planes hit a down current of air, which dropped them probably 500 ft. in about one second." As it requires a speed of about 340 m.p.h. to traverse 500 ft. in one second we would say that this was quite a remarkable down current of air.

• • • •

Speaking of bumps, reminds us of a story that is told by Maj. Hamilton Maxwell about one of his trips with the imperturbable Clifford Webster in a Curtiss Sea-Gull. "Cliff's" flying experience has extended over about fifteen years and almost anything can happen, aeronautically speaking, without surprising or bothering him a bit. The story demonstrates that very well and we think it worth repeating, at the risk of re-telling an incident that may be well known to many. One very bumpy and windy day, Maxwell and Webster had journeyed somewhere to get aerial photographs, and were returning home over the Hudson River, after obtaining the photographs. The photographic plates were stowed in corners of the cockpit, being in small heavy boxes. All went well until they were passing over a section of the river between high cliffs, when they were struck by a terrific bump and the machine was knocked down hard. The plane fell so fast and suddenly that two packages of plates, one on each side of the pilot, came up level with the top of the hull. There the wind caught them and they slid back along the boat right into the propeller. The propeller sent the first box of plates shooting out at right angles, knocking out an outboard inter-plane strut which happened to be in the way. The other box got under the propeller and was driven down through the hull, tearing a big hole in the bottom. "Cliff" found that by using all of the aileron control available, he could just about keep the ship level, so he started for the river. They managed to come down the 1200 ft. in a nearly normal flying altitude and landed without turning over. The boat started filling and sinking right away, however, and Maxwell, who had been wondering if they would ever get to the river safely, was now wondering how they'd ever get ashore. In the excitement of trying to get up on the wing before the boat swamped, Major Maxwell slipped and fell overboard. He had just come to the surface when Cliff hauled him in by the collar, and showed him the watch he had just pulled out of his pocket, saying, "According to my time, this flight was about fifty-five minutes."

A New Interpretation of America's Needs



The Stearman Whirlwind Mail Plane

Our offices and factory have been moved to a more central distribution point.
Please address all communication to

The Stearman Aircraft Co., Wichita, Kansas

The AIRSEDAN

The Leader of the Top Flight Class

SPECIFICATIONS

Weight empty .....2100 lbs.
Wing Span ..... 42 feet
Wing Area ..... 320 sq. ft.
Length ..... 28 feet
Pay Load .....1000 lbs.
Seating Capacity..Pilot and 4 Passengers

PERFORMANCE

High Speed (sea level) ... 120 M.P.H.
Landing Speed ..... 45 "
Cruising Speed ..... 100 "
Service Ceiling .....14000 feet

POWER PLANT

Wright Whirlwind J.5
Horsepower .....200 at 1800 R.P.M.
Fuel Capacity ..... 70 gals.
Oil Capacity ..... 4 gals.

EQUIPMENT

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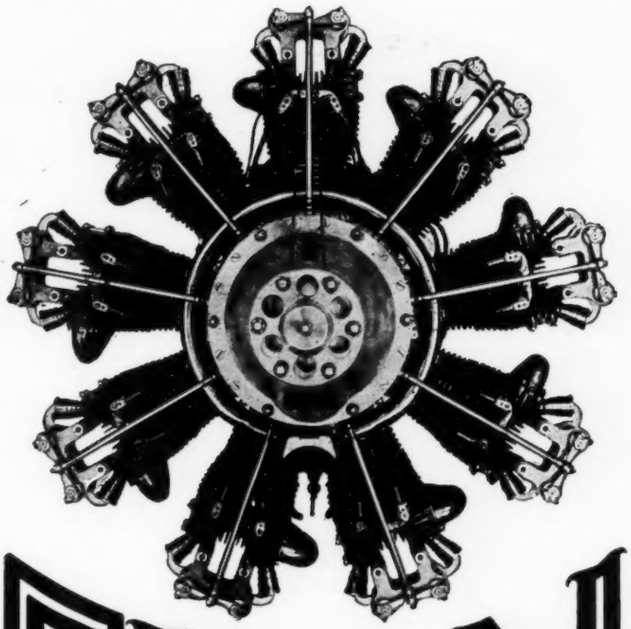

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Boise, Idaho

By Robert Blackstone

Mlle. Marceline d'Alroy of Paris, France, writer and lecturer on women's fashions, paid Boise an unexpected visit when the special plane she had hired in Salt Lake to transport her to Pasco, Wash., was forced down at the Boise Municipal Airport.

The French artiste lectured in Detroit and then discovered that in order to make a lecture date in the Olympic Hotel, Seattle, Wash., three short days distance, on time, she would have to journey by airplane, and she had never been in one before!

Leaving Detroit late in the evening she used four planes to reach Salt Lake and flew all night in order to do that. And then was informed, to her great dismay, of course, that the air service did not operate planes between Salt Lake and San Francisco on Sundays.

Nothing daunting she hired a fifth airplane and her pilot headed for Pasco, Wash., where she could have caught a train to Seattle. However, heavy winds in this mountainous region forced her plane to land at the Boise field.

"The city of Moscow, situated on Idaho's proposed airway No. 3, will take the lead in airway development in that part of our state," said Cyril C. Thompson, airways' president, who recently received notification of the founding of Aero Club of Moscow.

The members of the club, who have affiliated with the Idaho Airways Association, are McP. Bailey, Archie Parks, H. S. Ruddach, Alfred E. Hagan, L. F. Parsons, R. S. Butterfield, Chris. A. Hagan, C. E. Witter, George N. Lamphere, R. Hodgins, L. R. Scott, John Gray and H. E. Bush.

This group, with the cooperation of the Moscow Chamber of Commerce, will take steps to establish a first class airport and place such markings on roofs and field as will aid air travelers between Boise and Eastport on the Canadian border via Moscow.

As the University of Idaho, which is located at Moscow, is contemplating adding to its curriculum a course in aeronautics and allied subjects, Mr. Thompson is now seeking federal donations of obsolete airplanes and other equipment for experimental work in the U. of I. engineering department.

Moscow is now interested in airplane service to Boise and other southern Idaho points, said Mr. Thompson, who a short time ago, discussed Idaho airways before a meeting of the Moscow Rotary Club. The idea of flying from Moscow to Boise in less than four hours appeals to Moscow business men whom, he pointed out, now journey by train out of northern Idaho into the state of Washington; then into Oregon and then back into Idaho in order to reach their own state's capital.

Mr. Thompson also reports that McP. Bailey, former American Legion commander of the Moscow post, is planning to buy a commercial plane and put it to service of his fellow townsmen.

Idaho's governor, H. C. Baldridge, flew to his home town, Parma, Idaho, west of Boise a few miles in order to speak and attend the community day celebration and fall festival.

Virgil Adair, formerly of Los Angeles, now a local commercial pilot was the governor's official pilot.

Oklahoma City, Okla.

By Ernest W. Fair

Work on the new hangar of the Oklahoma Aero Club is about completed and the hangar almost ready for use. The building is constructed of steel structure, and is well ventilated by many windows, allowing light to pass into the room where the plane, a Stinson-Detroiter, is to be housed. The plane is here and has been in use for several weeks, both for pleasure of the club members and for commercial flying. The club has built its hangar on the east end of the large municipal field. The N. A. T. hangar is on the west side.

The American Legion Air Tour has been postponed. This tour, when it starts, will have at least a dozen planes in it, many of them for stunt purposes. The whole idea of the tour, a good one backed by Frank Douglas, its director, is to get new members for the Legion. It is going to visit about every town of any size whatever in this state and will last a week. The reason for the present delay is that the backers could not secure enough planes to make any definite impression at present. The trip has been postponed a month or perhaps two.

The Oklahoma City Aero Club is well under way and now has a large membership list, so large, in fact, that Burrell Tibbs has started instruction work for the members. This is one of the features of owning membership in this club, a fact that is going to enable many men and women of this town to learn how to fly. At a recent meeting of the club, J. Courts Hayes was elected vice-president, to succeed George S. Suggs who had resigned. W. E. Donnell was elected secretary and treasurer. Preliminary instruction was begun recently, however, when the club members went to Tibbs flying school. They are to receive instruction in fuselage lining, etc., soon.

A southwest convention is being planned for Oklahoma City soon under H. C. Martin's direction and that of the aviation committee of the Chamber of Commerce. This convention hopes to have all the city mayors as guests for the purpose in increasing air transportation facilities in various Oklahoma towns that now have none. The convention is to be held soon.

Tip Schier, former Oklahoma City stunt man, who has made many aerial death defying stunts in and near Oklahoma City, has opened a school at Bartlesville.

The airplane assembly plant of Bob Tarbutton and Virgil Browne is being completed in the new hangar. They are to have the local agency for the Stinson-Detroiter plane as well as the state agency. They have their plane here which is to serve, not only as a demonstrator, but also for passenger carrying and commercial work. In addition to the Stinson-Detroiter agency, Tarbutton has the agency for the Eaglerock. He intends to keep three to six of these planes here.

The Chamber of Commerce has named the following committee to arrange plans for the Southwest Aviation Convention: A. E. Warner, chairman; J. R. Green, Clint T. Johnson, Carl Dalbey and Thomas R. McHenry.

T. C. Flint, sergeant clerk at the local recruiting station has announced that the aviation corps of the U. S. Army is now open for applications after having been closed several months here. Only qualified high school graduates and experienced mechanics are being accepted.

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Wichita, Kans.

By H. E. Beverland

The new $45,000 factory of Travel Air, Inc., will be completed within 60 days, it has been announced by company officials. The building will be a duplicate of the present factory, which is 275 ft. long by 75 ft. wide. The production schedule of the factory is four planes a week. A force of 125 men now is employed and upon completion of the second building the number will be doubled and production will be from eight to ten planes a week.

Harry Brooks, a representative of Henry Ford, has accepted delivery of a Travel Air OX-5 biplane, which he flew to Detroit. The purchase was made by Ray Dahlenger of the Ford Motor Co.

W. B. Howell, Wichita oil man, has purchased his third Travel Air biplane, his last purchase being equipped with a Wright Whirlwind engine.

Richard Lees, Jr., department of commerce inspector for this district, has returned to Kansas City after giving tests to several pilots living in and near Wichita.

Mrs. R. G. Carden of Wichita, one of the first women airplane owners in Wichita, has received delivery of a new Travel Air biplane. Bower Hodson, her son, has just completed a course in flying at the local flying school.

H. C. Lippiatt, Travel Air dealer for southern California and winner of the San Francisco-Spokane air race in September, has personally received delivery of a new Travel Air biplane with an OX-5 engine.

Travel Air, Inc., announces completion of planes for Clyde W. Cook, operator of an air passenger service and school at Chattanooga, Tenn., and George Weis, Travel Air dealer at New York.

Winship and Long, owners and operators of several flying schools in Texas, have ordered a Swallow biplane for use of the Southern Airways Company, of which they are owners.

W. A. Williams, president of Milwaukee Air Lines, Milwaukee, Wis., has accepted delivery of a Swallow biplane for his company.

P. E. Tabraham of Ann Arbor, Mich., has placed his order for a Swallow biplane to be delivered in Dearborn, Mich.

The Arkansas Airways, Inc., has placed an order for a duplicate of its first plane with the Swallow Manufacturing Co. Major Carroll Cone, president of the company, expects to come to Wichita personally to take delivery, in the near future.

Lloyd Stearman, president of the Stearman Aircraft Company, has announced construction work on the company's first plane—a mail job for the Varney Air Line, Inc., has been started. The company reports it is progressing rapidly with installation of factory material.

San Diego, Calif.

By Andrew R. Boone

Commercial aviation in the United States will make tremendous strides during the next few years on a sound basis, making the rest of the world take notice, Glenn Martin, airplane manufacturer of Cleveland, Ohio, who is one of America's leading aeronautical experts, declared here recently.

Mr. Martin arrived here a short time ago with his mother by automobile, on a short vacation. He visited North Island and met with Naval and Army officials there, and conferred with them regarding the use of Martin planes by both services.

A construction program of 102 new Martin bombing planes for the Navy has just been started, Mr. Martin announced.

"We have been delivering planes to the Navy at the rate of one each day and we have just completed the delivery of 200 of the latest designs", he said.

Martin is a pioneer California pilot, having learned to fly

and also to construct in a little home-made shop at Santa Ana years ago.

In predicting a rapid development in commercial aviation, Martin stated that he expected to be putting commercial planes on the market within two years.

"Military aviation in both the Army and Navy is now progressing along a sound basis as a result of the five-year program", he said. "Things in the aeronautic field are pretty well engineered all around, although I expect to see some astounding things come out in an engineering way before long."

Santa Monica, Calif.

By George L. Geiger

"Aviation and the Sub-divider" was the subject of a paper prepared by Major C. C. Moseley, former commandant of Clover Field, now of the Western Air Express, read before a state convention of realtors just closed in Santa Monica.

Points scored by the speaker were that flying will have tremendous effects upon the real estate business, particularly in giving value to locations through bringing about accessibility and that as a consequence of this development, millions of dollars in land, now valueless because of inaccessibility, will be sold and peopled.

C. D. Smalley, Western Air Mail executive was a recent visitor to Santa Monica and sister Bay Cities and before different civic and service organizations, reviewed the history of aviation and outlined its future in certain clearly defined lines. Mr. Smalley paid Southern California a high tribute for patronage of the air mail service. A passenger airline service between Los Angeles and San Francisco is proposed, he added, three twelve-passenger super-planes having been ordered. These are being built in cooperation with the U. S. government and have been made possible by the assistance of the Guggenheim Foundation.

The L. M. Bach Aircraft Corporation of Clover Field announced the signing of a contract between that concern and the West Coast Air Transit Company during the week for the manufacture and delivery of ten "air yachts", the amount involved being reported at approximately $300,000, making it one of the largest private commercial purchases of record. The first plane, an eight-passenger machine, with spaces for two pilots, will be delivered by December, L. M. Bach, designer and vice-president of the company bearing his name announced, and will be placed in operation between Portland and Seattle, the complete order to be delivered by May, by which time regular passenger service will have been established between Los Angeles and Seattle. The "yachts" will have three engines with an aggregate of 625 hp., a 425 hp. engine in the center and a 100 hp. engine in either wing. In addition to comfortable reclining seats, the plane will have baggage room, lavatory, hot and cold running water and other appointments which have suggested the term applied. One plane has been undergoing test flights for some weeks.

L. Heffron of Hollywood is president of the Bach company, Carl Fucett, Los Angeles attorney, George Barry and Earl Anthony are other officers. The Western Air Transit Co. is largely headed by executives of the Pickwick Stages Co., well-known Pacific coast concern, but is a separate company. Officials mentioned in connection with the deal for the ten planes are Charles Eakin, vice-president of the Pickwick company, M. Ballam, general passenger agent, and Bert Ramm, Los Angeles.

New Brunswick, N. J.

The Aero Club of New Brunswick was organized one year ago by a group of aviation enthusiasts. Regular monthly meetings were held during the winter and it was decided to buy a plane in the spring. After several demonstrations, a Pitcairn Orowing was chosen. This plane has been used

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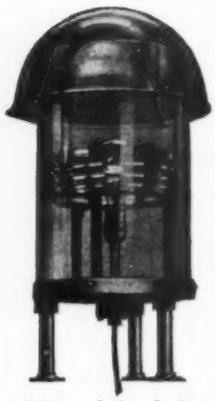

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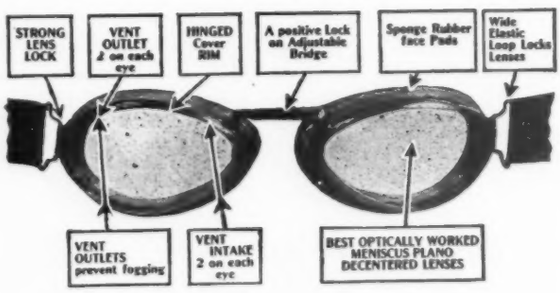
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steadily throughout the summer and eight students have been trained and soloed in it. It has been used on numbers of cross-country trips to Philadelphia and Long Island. Each active member of the club owns a share in the plane. The club has 100 members.

The New Brunswick Airport is less than a five minutes drive from the local Pennsylvania station. On the north side the field is bordered by the Lincoln Highway and on the south by the railroad. There are two large circles on the field and several planes are readily seen. Good servicing facilities are available and it is hoped to begin the erection of a hangar soon. Visiting planes are always welcome.

Perth Amboy, N. J.

Situated opposite the southern end of Staten Island, about fifteen miles southwest of the Battery, New York, Perth Amboy offers an ideal location for a model airport with land and seaplane facilities on Raritan Bay.

To arouse Perth Amboy and the surrounding communities to these facts, and to initiate a movement to secure an airport, a dinner was held at the Elks Club, Perth Amboy, Oct. 27, under the auspices of the local chamber of commerce and city officials.

President Jacob M. Klein, of the chamber of commerce, presided at the dinner, which was attended by several hundred air enthusiasts representing clubs and civic organizations. Clarence Chamberlin, Bert Acosta, Lester Maitland, Eric Nelson and Leigh Wade accepted invitations to attend, but of this group of famed American fliers, only Lieutenant Wade put in an appearance.

While disappointment was expressed at the absence of these pilots, Lieutenant Wade, of the Round-the-World Flight, and Dean Smith, one of the aces of the New York-Cleveland leg of the air mail, gave talks that were enthusiastically received.

Other guests and speakers were Mayor Dorsey, of Perth Amboy, Floyd K. Smith and Horace Kean, veteran pilots, and George Newbold, business manager of AVIATION.

Wm. V. Garretson, local Packard dealer, and former air service pilot, acted as general chairman of the airport celebration.

The airport enthusiasm displayed at the dinner will, it is expected, soon result in actual acquisition of land and means to give Perth Amboy adequate airport facilities.

Atlanta, Ga.

By L. T. Jones

The big event in the Southeast recently was the opening of the Augusta, Ga., airport. The field was dedicated as the Raleigh Daniel Airport, named in honor of the present mayor of Augusta. More than 40,000 people attended the dedication. Forty-seven airplanes, representing the Army, Navy, and Marine Corps, as well as civilian fliers, maneuvered over the field during the day. W. P. MacCracken, assistant secretary of commerce for Aeronautics, and Lieut. Lester J. Maitland, Army flier of Honolulu flight fame, were among the notables present. There were present official delegations from Atlanta, Charlotte, Columbia, Greenwood, and Savannah.

The new field has been approved by the Department of Commerce, and will soon be lighted and a number of hangars built. It will greatly enhance the plan of Augusta to have that city designated as a stopover point on air mail routes. Augusta in 1911-12 was an Army aviation training center.

The people and officials in Augusta are taking the greatest possible interest in aviation and realize the benefits that will accrue to their city through the new field.

Capt. Beeler Blevins, it is reported, is preparing to or-

ganize a company to be used in the development of a school and a transport service at Candler Field. Blevins already has a school at the field and a taxi service. He recently flew to Washington, D. C. and return, using a Ryan monoplane.

Southeastern Airways, Inc., of which Capt. Douglas Davis is president, and E. M. Romberger, vice president, is preparing to expand the aviation school that Davis now conducts at Candler Field. Davis is probably the best-known flier in Georgia. He operates seven planes at Candler Field. Romberger is an ex-Army pilot and served in France.

Baltimore, Md.

By Harry Rudo

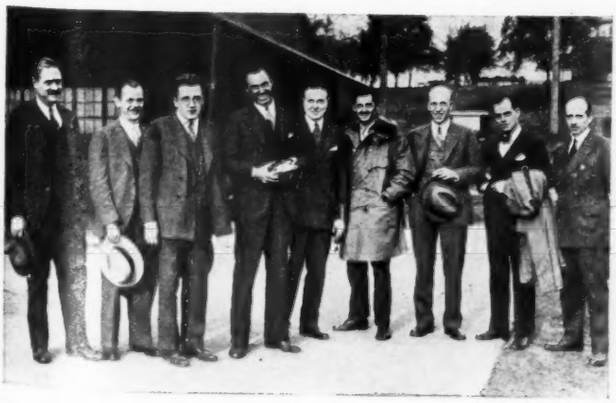
A banquet, in honor of Van Lear Black, was given recently by a group of prominent Baltimoreans. Mr. Black completed a 22,000 mile airplane trip from Amsterdam to Batavia, Dutch East Indies, and return, to prove that it was possible to operate a regular air line between these cities. Among the 500 present were Secretary of Commerce Herbert Hoover, Assistant Secretary of War for Aviation F. Trubee Davison, Assistant Secretary of Commerce for Aeronautics William P. MacCracken, Comdr. Richard E. Byrd, Anthony Fokker, designer of the plane used, Glenn Martin, Johann B. Schotte and Gerritt J. Geysendorffer, the pilots who accompanied Mr. Black.

Commander Byrd, in the course of his brief address, divulged a secret that he had kept for a year and a half, and that is that Mr. Black was a principal backer of his North Polar Flight. His aid decided the venture. All speeches of the evening dealt with aviation.

The banquet hall, for the occasion, was transformed into an airplane hangar by decorations. When all had been seated, the roar of a propeller could be heard, and lights were focused on a model of the Fokker plane. The propeller whirled, and lights on the plane twinkled as a signal to clear the field. The walls also were decorated with scenes of the cities visited.

An aerial survey of traffic on the Baltimore-Washington boulevard was made recently. This highway always is crowded with automobiles and it was the purpose of the survey to find out just how crowded the road is. Every foot of the road, which is 40 miles long, was photographed from a height of 3,600 ft. This required 126 pictures. The survey was very successful.

Welcome Art Goebel



Reception committee of Aero Club of Pittsburgh, which welcomed Art Goebel. Left to right: Col. Wm. Thaw; Robert E. Dake, president; J. E. Phillips; "Art" Goebel; Hon. James M. Magee; Capt. Thomas S. Voss, of Rodgers Field; Raymond M. Marlier; Fred E. Hamlin, and James A. Bell, Jr.

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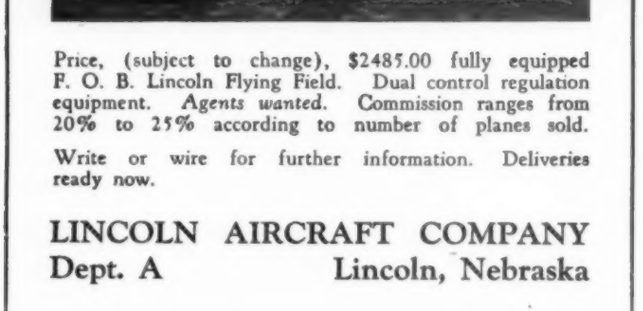

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Varney Air Lines

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Boston, Mass.

By Daniel Rochford

Aviation business is becoming competitive in Boston. In a few days announcement of the opening of a down-town office for the selling of aerial services, instruction, etc. is to be made by the Dennison Aircraft Company at Atlantic. John Bagley, at present with Air Service of New England, Inc., is to be in charge. Until this time Air Service has been the only down-town air sales office since the shift by the Boston Airport Corporation of their books, records and business office to their hangar at the Boston Airport over a year ago. Colonial Air Transport, Inc., has desk space in the Chamber of Commerce building where Sumner Sewall, traffic manager, handles his air mail work.

A shift in technical line-up also is promised, according to President John D. Haughey of Air Service. His company until now operating through the Boston Airport Corporation as Fairchild picture and map agents, is taking the contract directly in its own name and will continue to develop business throughout New England. His company has sold over thirty thousand dollars worth of picture work since last March and has just closed contracts for a number of city and town aerial maps in Massachusetts. Pilot Russell arrived in Boston from the Fairchild plant to personally handle the new mapping contracts.

Increased business at the airport has resulted in the addition of another pilot to Boston Airport Corporation ranks. Robert Nagle, one of the leading National Guard fliers of the state and in charge of the 101st Photo Section, is now instructing and doing cross-country flying and picture work for the B.A.C. H. Stark, who has been flying the air mail run for Colonial Air Transport, Inc., has also done local flying for the B.A.C. Pilot Al MacClain is expected from the West Coast in a fortnight. Ralph Wickford and R. L. O'Brien, and Chief Pilot B. F. Billings have been also busy.

An idea of the profits Boston operations sometimes yield was given when two open planes at Dennison Airport, each able to take only two passengers at a trip, are reported to have collected $1800 in one week. This includes student work as well as passenger flights. Measured in terms of five dollar joy hops (five dollars is Boston's going price for such flights today) that would mean 360 flights or an average of 51 daily every day all week. Needless to say this is a record figure.

New flying students are increasing about six a week in Boston. The newest birdmen are: William W. Johnson of Dorchester, James M. Shoemaker of Cambridge, Robert S. Riley of Boston, Robert Goldberg of Cambridge, R. H. Sanger of Cambridge, L. T. Bradbury of Babson Park.

The Harvard Flying Club has been having a land-office popularity. The club, composed chiefly of college undergraduates with a sprinkling from the law school and graduate courses, announces a competition open to undergraduates. The prize is an election to the club subject to its regular dues and charges. The club has thirty-one members and limits itself to fifty. Forty-six students reported for the contest and they give a couple afternoons a week and part of each Sunday to doing everything from washing the plane to running errands and keeping books.

Their example perhaps accounts for the departure of the Harvard Business School into the realms of aviation. A collection of commercial air posters has been assembled together with statistical data from various European air lines. Lectures are scheduled with C. H. Biddlecomb, formerly of Colonial Air Transport slated to do a trick on the general subject of "The Inferiority of American Air Transport Lines."

The first vocational conference on aviation found 120 young men and six girls seated in the library of the Boston Cham-

ber of Commerce one night recently. Daniel Rochford presided, introducing the following speakers: Major Ira Longanecker, who told of Army flying; Lieut. Reginald D. Thomas, who did the same for the Navy; Raymond P. Baldwin who talked on lawyers and aviation; Everett P. Gordon who told of radio and flying; Edward T. O'Toole, who discussed mechanical work and aircraft maintenance; Sumner Sewall who told of work with the big transport companies; Walter F. Eade of M.I.T. who told of opportunities in the teaching of aeronautics; Franklin T. Kurt, who talked of work in aviation manufacturing and of the operation of private airports; and John D. Haughey, who spoke on air service sales and the business future in aviation. Each speaker answered questions from the floor. The conference lasted from eight until eleven, when the meeting adjourned to cider and doughnuts. The hall was finally cleared by the janitor's turning out the lights at 12:10 A.M. Since the conference twelve men have signed up for flying courses and about fifty-two for ground school work with others enrolling for the free Army correspondence courses and the new night course which the University Extension Department of the Massachusetts education board is to open next month with Lieutenant Eade as instructor.

Increased air activity promises a second hangar at the airport as soon as the state can decide what it wants to do there. Seventeen planes were on hand for service one night recently. Since only eight can get into the present Boston Airport Corporation hangar, the rest had to be staked down in the old 1921-1926 fashion. One ticket salesman at the airport, George Barry by name, sold 100 flight tickets Sunday, Oct. 23. That date is a week or so astern but the figure is interesting and gives some support to Dennison's claim of $1800 week's return on two planes.

The Statler Hotel held dedicatory exercises for its new roof signs for aerial travelers recently. That same noon the Boston Municipal Air Board met at the Chamber of Commerce to consider Capt. Horace N. Heisen, airport commander's reactions to a plan to lease the airport site to the City of Boston.

Interstate Airways at Hartford are to act as sub-agents for the Boston Airport Corporation in the sale of Travel Airs. Dennison Aircraft has taken on the agency for Fairchild planes and engines from the Air Service of New England, Inc., which is to devote its time to sales of air services and products rather than planes.

Flying for the last week in October as reported by the various flying groups of Boston totalled: Harvard Flying Club 895 min.; Boston Airport Corporation, 3289 min.; Dennison Aircraft Corporation 1285 min.; Naval Reserve Air Station at Squantum 2944 min.; National Guard 720 min.; and Army 1740 min. Miscellaneous flying done by private operators would add about ten hours to this total.

William Eaton has been appointed traffic manager for the Boston Airport Corporation. He has served as airport manager at Nantucket the past summer and owns and operates his own C-6 Travel Air biplane.

Duluth-Superior, Minn.

By H. A. Lindbergh

The Public Affairs Committee of Superior is sponsoring a contest that is of interest to the air-minded Duluth and Superior girls, as well as their friends.

Pins, in the design of an airplane, are to be sold by the contestants for fifty cents and one dollar apiece, the proceeds of which will be used in improving the Arrowhead Airways Field in Superior. The girl in each of the two cities, who sells pins for the largest amount, will receive a complete flying course as well as a flying outfit. The runnerup in each town will be entitled to seven hours of flying.

John Goodall, who is building up a reputation as the only

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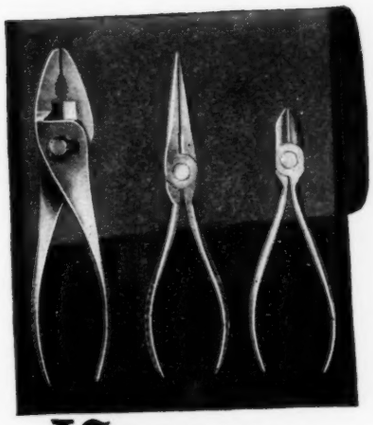

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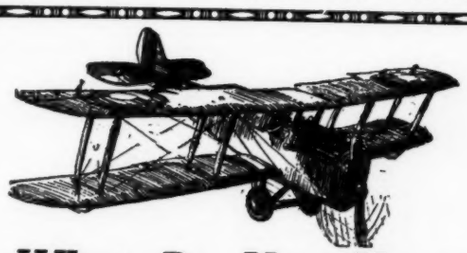

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parachute jumper in this section, made a drop as a feature attraction during an Ernie Nevers football game in Duluth and left immediately thereafter for Grand Rapids in a plane piloted by Eddie Middaugh, where he added another successful leap to his list.

Hartford, Conn.

By B. A. Pollet

Maj. Gen. Morris B. Payne left Brainard Field in one of the 43rd Division's PT-1 planes with Captain Fleet as pilot, for a cross-country trip to Albany. General Payne had to resort to a plane after having missed a train and subsequently having a breakdown in a motor car.

The New England Aircraft has definitely set a date for the beginning of the erection of its hangar at Brainard Field. The hangar will be the regulation 60 by 100 ft., constructed of concrete and steel and will face the field on a line with the National Guard buildings.

Tests are being conducted by the Pratt & Whitney Aircraft Co. with their Boeing mail plane, with a view of improving the carburetion at high altitudes. Each day their plane may be seen flying at from 14,000 to 16,000 ft. and the roar of the Wasp can easily be distinguished from the purr of the OX5's that are so prevalent on the air fields.

The Royal Typewriter tri-engined Ford-Stout arrived at Brainard Field recently and loaded another shipment of portables for distribution throughout the country. Their request for hangar space has been withdrawn as they anticipate building in the Middle West, nearer to their markets.

An important contribution to aviation was made by Dr. Lawrence G. Sykes and Dr. William B. Smith, respectively medical director and assistant medical director of the Connecticut General Life Insurance Co. of this city. They completed and presented a paper entitled "Aviation and Life Insurance" to a meeting of the Association of Life Insurance Medical Directors, in New York. The paper is the result of an exhaustive and systematic survey of aviation activity, based upon reports received from practically all companies operating planes either in the passenger, mail or taxi service. The dispatch with which the questionnaires sent out by Dr. Smith were filled out and returned, gave proof of the interest with which his efforts to collect the facts, was observed by the aeronautic industry. Dr. Smith is happily entirely competent to make such a survey, since he is not only assistant medical director of the Connecticut General, but is also flight surgeon of the 43rd Air Squadron, Connecticut National Guard and resident medical examiner of the Department of Commerce. The paper contains the tabulated information received from the various companies and in addition contains a critical survey of the progress of aviation with particular emphasis on such matters as will have a bearing on insurance underwriting.

Of particular interest will be such an item as the following: "Besides the liberalization of their policies by the accident insurance companies, fifty of the leading insurance companies of the United States and Canada are covering without restrictions, travel by air of their policy holders to the extent of $73,276,279." This is of course a truly astounding sum and will prove a revelation to a great number of people who have never examined their own policy very closely. He also urges that insurance companies take nothing for granted, make no assumptions but get the facts. That these facts are now available may be gathered from the profusion of data included in the report of Dr. Smith.

Inasmuch as Hartford is probably the most important insurance center in the United States, it is expected that this critical survey will do much to alter the attitude of the issuance of policies covering flying activity.

UNITED STATES AIR FORCES

Reserve Officers Called to Active Duty

In order to carry out that provision of the five year air program, which authorizes the President to call Air Corps Reserve Officers to active duty for an extended period of time, the number of officers required for this service will be apportioned among the several corps areas in proportion to the number of reserve officers in each area who are qualified for such duty. Each corps area commander will be called upon to recommend reserve officers, available for an extended period of active duty, for specific assignments up to the limit of his quota. When any corps area commander can not meet this requirement, the chief of air corps, or at his request, another corps area commander will be called upon for additional recommendations.

In cases where it is contemplated to order officers of the Air Corps reserve for extended active duty to an installation in a corps area, other than that in which they live, or to which they are accredited, the corps area commander, who has jurisdiction over the installation, will be consulted prior to the issuance of the orders.

To Photograph for Shipping Board

At the request of the United States Shipping Board, the Army Air Corps has been directed to take aerial photographs of the reserve fleets controlled by the board. These aerial photographs will illustrate compilations and reports relative to the preservation of the vessels now out of commission.

Photographs will be made of the San Francisco fleet located in Southampton Bay at Benecia, Calif.; Patuxent River Unit consisting of passenger ships Agamemnon and Mount Vernon, located in the Patuxent River south of Point Patience, near Solomon's Island, Md.; the Caldwell fleet located near Jones Point, Hudson River, about 40 mi. north of New York City; and the Staten Island Fleets No. 1 and No. 2 located in Staten Island Sound.

Navy Postgraduate Engineering Courses

The Bureau of Navigation has sent out a circular letter on the subject of post-graduate instruction in engineering. Boards to select candidates for this post-graduate instruction will meet on or about Dec. 1.

It is understood that qualified pilots up to three will be selected for the post-graduate course in ordnance, these three to be in addition to the six officers to be selected from the general line. Four officers from the line will be selected for post-graduate course in aerology; three qualified naval pilots will be selected for the course in aeronautical engineering and several qualified naval pilots, who are also qualified radio operators, will be among the ten who are selected for the post-graduate course in communication engineering.

The boards will consider requests of applicants in engineering and ordnance who have had five or more years of commissioned service on July 1, 1928, and for aerology those who have had two or more years of commissioned service.

Applications should be submitted through official channels, appended endorsements and the officers' records, and a statement of qualification and experience in each case should accompany the applications.

The Department requires that officers applying for post-graduate instruction submit, with their applications, signed agreements not to resign during the course and to serve three years in the Naval service after the completion of their post-graduate courses.

Selections of candidates will be announced prior to Feb. 1, 1928.

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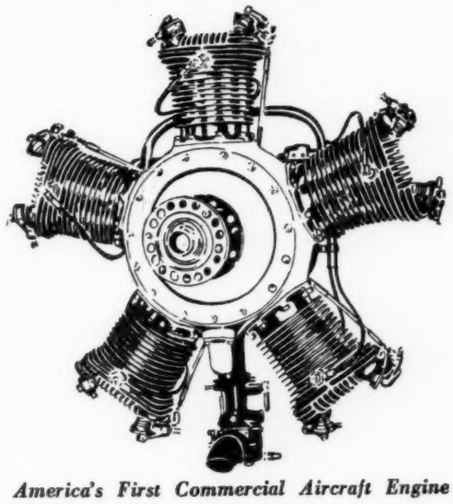

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PUBLISHER'S NEWS LETTER

After a very hurried trip to the aeronautical centers of Europe, it will probably be of interest to the readers of AVIATION to receive a few of the impressions gained at first hand by one who is usually regarded as representing the group who read this paper every week. It is obvious that within six weeks only a most superficial view could be had of aeronautical progress since last year in England, France, Holland, Germany and Italy, but at the Schneider Cup Race at Venice and at the Fourth International Congress of Aerial Navigation at Rome. aeronautical representatives of forty countries were present and the interchange of opinions was valuable in securing a general impression. So that the cities of northern Europe could be visited quickly between the two above mentioned aeronautical meetings, a flight was made from Venice over the Alps to Vienna and from there via Prague to Berlin. From Berlin to London by way of Amsterdam completed the aerial journey of this year. Some of the interesting aerial developments that were observed will be briefly described in the Publisher's News Letters of the next few issues.

* * * *

The most important development in aeronautical engineering in Europe is, without doubt, the new Handley Page automatic slot. This should not be confused with the original Handley Page slotted wing as its usefulness and characteristics are very much more important. If the opinion of leading aeronautical engineers is given proper weight this new improvement for airplane wings will be used on every modern airplane within a few years. Unfortunately, during the period when Mr. Handley Page is negotiating for its use in various countries the details of this new safety appliance may not be given, but perhaps some idea of the results accomplished may be had from a description of a flight which the Publisher of AVIATION was privileged to make at Cricklewood, England, in October before the Daily Mail of London had made public the news of the invention.

* * * *

Mr. Handley Page was present at the dinner given to the R.A.F. pilot Webster who won the Schneider Cup at Venice. He immediately invited his American friend to visit his works and see "the greatest advance made in airplane design since the Wright Brothers flew". Mr. Handley Page's well known enthusiasm and sense of publicity did not warp the judgment of his old friend but only aroused a curiosity that was to be more than satisfied. Within five minutes after arriving at Cricklewood, the visitor was in a gun ring cockpit of a Handley Page airplane and was watching the well known test pilot England take off, using the older Handley Page slotted wing to shorten the run. Once in the air, the slotted wing was shut and the automatic slots on both ends of the entering edge of the wings commenced to function. These slots are automatic in every respect. They open and close without any control from the pilot. An arrow pointer is attached to the experimental types so that the pilot and passenger may know the exact amount of opening of the slot at all times. The ceiling was only about 1500 feet owing to foggy weather but the plane climbed to 1800 feet. The pilot throttled the engine and turned to his passenger and said "Now we are completely stalled".

* * * *

Ordinarily, the nose would gradually drop and through loss of control the plane would go into a spin. But nothing of the kind happened. From 1800 feet to 600 feet the plane gradually descended and to show that it was under perfect control, England kicked his rudder several times to demonstrate. If—as is claimed and demonstrated—this device can be used on any type of plane and will give control when the plane is stalled up to 25 degrees the danger of spinning will have greatly reduced and another milestone erected along the road of aerial progress. To those who have been in a stalled airplane at 600 feet or under, the thrill of coming out by merely opening the throttle and picking up speed will be realized. But even this accomplishment is not all of the safety feature of the new automatic slot. As is well known the greatest danger of a stall is at take-offs. If a plane were able to turn when stalled during a take-off another great element of safety would have been achieved.

* * * *

"Now, Mr. Gardner, we will do a flat turn." If dropping 1200 feet in a stall produced a new sensation, the making of a complete turn of 360° without an inch of bank not only produced a breathless fear but so astonished the marvelling passenger that he was very glad to once more land and examine this uncanny mechanism that made the unbelievable possible. Particularly as it was the thirteenth of October. What had happened was that the slots had given the pilot perfect control while skidding around the turn and while the side blast of wind nearly blew our heads off, the plane appeared to remain under perfect control. To go through two of the most dangerous maneuvers that can be tried within a five minute flight was enough for one day. How the slot functions, its theory, its practicability and its other possibilities will have to be told by Mr. Handley Page when he is willing to do so. But at this time, although the flight was made under the restrictions of confidential relations the above general idea may be published even though it may be irritatingly vague.

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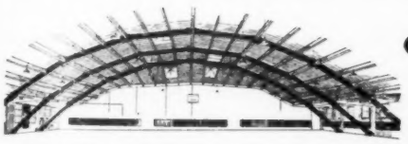

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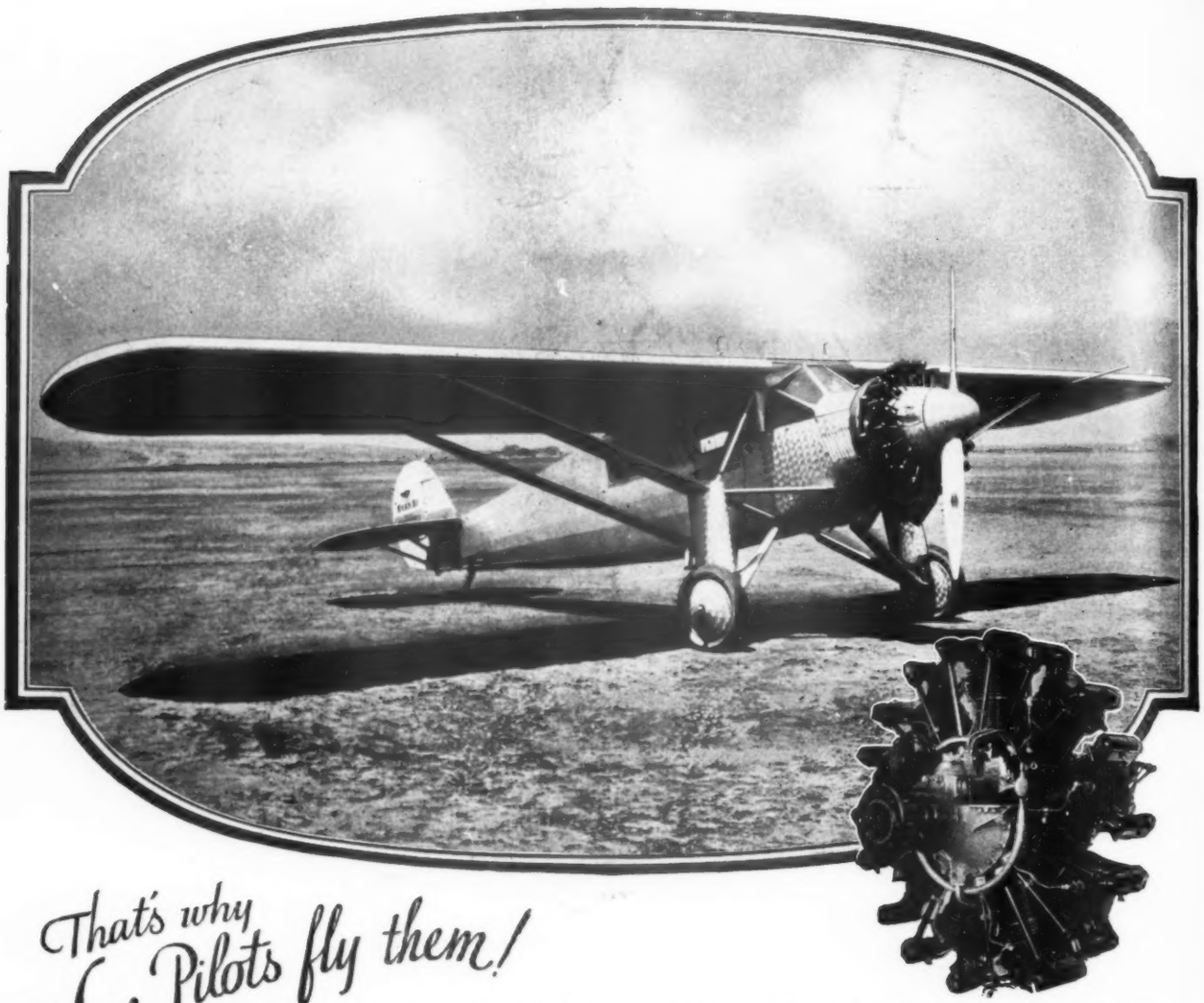

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